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Metals Review

VOLUME XXVIII, 3 March, 1955

THE NEWS DIGEST MAGAZINE

CONTENTS

IMPORTANT LECTURES

DEPARTMENTS

ASM REVIEW OF METAL LITERATURE

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Ambassador Hotel, Los Angeles

Western Metal Congress and Exposition

The Ninth Western Metal Congress and Exposition long will stand as the two most important metal events of 1955 in the western states.

They will be educational in nature, informative and helpful to everyone engaged in the metal industries, inspirational in the application of new equipment, processes and methods, and wholesome in establishing a higher economy in plant operation.

The Western Metal Show will cover the entire range of metalworking, applying, testing and inspection. It will stress heat treating, welding, forming, machining, cutting and inspecting metals.

The Western Metal Congress will bring out further new developments. Much of it will be presented in panel form to encourage questions on specific problems from the audience.

In the interest of plant prosperity and production quality throughout the West's great metal centers, it is my pleasure to invite you to attend the two important events which the American Society for Metals and 24 cooperating societies have arranged for you and now place at your service.—George A. Roberts, President A.S.M., Vice-President, Technology, Vanadium-Alloys Steel Co.

"The New in Metals and Metalworking" will be the theme of the Ninth Western Metal Congress and Exposition to be held Mar. 28-Apr. 1 in Los Angeles. No series of technical meetings or exhibits of metalworking equipment, methods and processes ever has been so closely geared to metal manufacturing and fabrication processes in the West as those incorporated in the Western Metal Congress and Exposition.

Every session of the five participating societies will answer questions, solve troublesome production problems or present numerous hints on improved use of metals.

The American Society for Metals will hold a series of technical sessions composed of panels of experts and covering the following subjects: **Monday**—Die Materials and New Forming Methods, and Today's Titanium Problems and Opportunities; **Tuesday**—New Metals in the Petroleum Industry, and High Strength Steels; **Wednesday**—Powder Metallurgy; and **Thursday**—Metals for the Electronics Industry.

The Industrial Heating Equipment Association will hold two sessions on "Heat Treating Problems" on Wednesday and Thursday mornings under the sponsorship of A.S.M.

New developments in welding for heavy industry and for aircraft and rockets will be described in nine sessions to be held by the American Welding Society throughout the week. Speakers will include welding experts and research men from all over the country. An important part of this program will be the two-session panel on "Welding for Aircraft and Rockets."

The high quality achieved through nondestructive testing for aircraft, missiles, rockets, automobiles and other assemblies will be brought out in five days of sessions to be held by the Society for Nondestructive Testing. Authoritative speakers will deliver papers stressing the economy in human life and dollars effected through newly developed nondestructive processes, methods and systems.

A special session on "New Developments in Foundry Work" will be held Monday evening by the Los Angeles Chapter of the American Foundrymen's Society. In all, 24 technical societies are joining forces to sponsor the Western Metal Congress and Exposition.

Technical sessions of the participating societies will be held at the Ambassador Hotel in Los Angeles. The complete program is carried in the March issue of *Metal Progress*, p. 71 to 76.

Share-Information Plan

By: W. H. Eisenman

Secretary—American Society for Metals

More than 350 concerns of high repute will exhibit their products, processes, methods and other new developments at the Western Metal Exposition. Similarly, new products, processes and methods in the metal field will be disclosed at the Western Metal Congress by the intelligensia of metal research.

Experts who will be manning the exhibits and conducting the panel discussions will be ready and glad to share their knowledge. For that reason, metal plant operators, executives and technical engineers should attend both events.

Once there was a time when each

(*Continued on p.* 5)

(*Continued from p. 4*)
metal plant erected a high figurative wall around itself and its processes. The walls were so dense and formidable that nobody could see past them —either in or out. Even when members of the walled concerns went outside for a "look-see" at other plants, they found themselves blocked off, wherever they went.

These walls are now torn down. The metal industry operates on a policy of help-one-another, and desires to share its scientific knowledge.

A.S.M. is a wide-scale clearing house for dispensation of technical and scientific information. It was an important factor in razing the "walls" around metal plants and in eliminating the so-called "mysteries" with which metal production was once invested.

On the Pacific Coast, for the ninth time, the Western Metal Congress and Exposition will stand as two of the methods by which A.S.M. transfers metallurgical information from one operator to another and advances metal fabrication.

The Vacuum Melted Metals Theme at Hartford Meeting

Speaker: James D. Nisbet

Universal Cyclops Steel Corp.

James D. Nisbet, research director, Universal Cyclops Steel Corp., spoke on "Vacuum Melted Metals" at a meeting held by the **Hartford Chapter.** His talk traced the development of research of vacuum melted metals up to present-day acceptance in highly specialized applications of a commercial nature.

Mr. Nisbet defined new melting considerations as steps in purity achievement, which carried the discussion through various melting methods such as electric furnace, vacuum induction, vacuum arc, levitation melting and zone melting. He described the first 1000-lb. induction vacuum melting furnace in the United States on repetitive service which was installed by his company. **—Reported by E. B. Bartek for Hartford Chapter.**

Schedule Investment Casting Conference

The **Albuquerque Chapter** has announced that it will hold an all-day conference on "Investment Casting" at the University of New Mexico on Apr. 4. The program, under the chairmanship of J. R. Townsend, Sandia Corp., and H. P. Dolan, Investment Casting Institute, will include papers on the following:

The Investment Casting Process and Its Field of Application; Design Factors Applicable to Investment Castings; Investment Casting Materials; General System for Quality Control; and Inspection Methods and Cast Test Bars.

A.S.M. of Tomorrow

A. S. M. Metallurgical Seminars

The third point in the bold scope of A.S.M.'s Five-Point Program ranks high among progressive actions in the past quarter-century. Regularly scheduled, intensive one-and-two-week seminars at advanced educational levels should provide for working metallurgists and for the nation's top-rated production engineers, metals engineers and designers a refresher course offering tremendous advantages in the solution of specific problems and the advancement of all phases of modern metallurgical techniques.

As a key factor in A.S.M.'s program, the Seminars in themselves would be of immense and measurable value to the nation. As a part of the entire program, the Seminars will create an effective answer to a significant part of the urgently needed national up-grading of metallurgy and of metallurgists in the public and industrial esteem. C.S.

The third step in the program is the A.S.M. Metallurgical Seminars. These seminars will present, continuously throughout the year, intensive one-week and two-week institutes for discussion and study at an advanced educational level of important and current phases of metallurgy and metals engineering. For these seminars will be assembled the top scientists and specialists in the field under discussion. They will constitute informal discussion groups devoted to individual metallurgical problems, as well as refresher courses in metallurgical procedure.

Seminars are becoming increasingly important in providing opportunities for members of organizations to meet together to exchange information, solve common problems, make decisions, bring to participants the results of study and experience in the field under consideration, together with practical application to specific problems. Attendance at these seminars will be limited to insure maximum attention to individual needs.

The A.S.M. Metallurgical Seminars will be in session throughout the year (not confined to the few summer months) and will thus afford a gathering center or forum where metallurgical problems and new information on metals engineering will always be the prime topic for conversation and study.

Briefs New Orleans on Carburizing Advances

Speaker: E. N. Case

American Cyanamid Co.

E. N. Case, supervisor of the metals-chemicals section of American Cyanamid Co.'s Industrial Chemicals Division, spoke before the **New Orleans Chapter** on "Advances in Carburizing Baths". His talk included a discussion of the general process of surface hardening, particularly as applied to such products as key case hooks, scissor blades, ball bearings and similar products.

Technical Papers Invited for A.S.M. Transactions

The Publications Committee of the A.S.M. will now receive technical papers for consideration for publication in the 1956 *Transactions* and probable presentation before a national meeting of the Society. A cordial invitation is extended to all members and nonmembers of the A.S.M. to submit technical papers to the Society.

Many of the papers approved by the Committee will be scheduled for presentation on the technical program of the 37th National Metal Congress and Exposition to be held in Philadelphia, Oct. 17-21, 1955. Papers that are selected for presentation will be preprinted. Manuscripts should be received at A.S.M. headquarters office not later than April 11, 1955.

Acceptance of a paper for publication does not necessarily infer that it will be presented. The selection of approved papers for the convention program will be made early in June.

Manuscripts in triplicate, plus one set of unmounted photographs and original tracings, should be sent to the attention of Ray T. Bayless, assistant secretary, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

Headquarters should be notified of your intention to submit a paper, and helpful suggestions for the preparation of technical papers, illustrations and drawings will be gladly forwarded.

Discusses Environmental Testing

Sustaining Members of Washington Chapter Who Heard J. R. Townsend Discuss "Environmental Testing" Included, From Left: R. E. W. Harrison, General Alloys Co.; E. F. Mechlin, Jr., Crucible Steel Co. of America; H. N. Arbuthnot, Allegheny Ludlum Steel Corp.; Miss H. Eygenraam, University of Maryland; L. K. Hyde, O. S. Peters Co.; J. Tope, Republic Steel Corp.

Speaker: John R. Townsend
Sandia Corp.

John R. Townsend, director of materials and standards engineering for the Sandia Corp., gave the address for the Sustaining Members Night meeting of the **Washington Chapter.** He spoke on the subject of "Environmental Testing".

In the Indian cliff dwellings of the Southwest can be found organic artifacts such as sandals, cordage and timbers in housing over 1000 years old which are still in a good state of preservation. In the Northeast and Middlewest can be found covered bridges that have stood through several lifetimes of standard wooden bridges. In each case, the answer to the long life of these objects lies in the absence of moisture in the environment. In the dry desert atmosphere, fungi and insects cannot thrive, and the structural timbers under the roofs of the covered bridges have been kept free of moisture.

The importance of environment on the life of man-made products is now well recognized in the decay of organic matter, the corrosion of metals and the growth of fungi. Today, however, the additional atmospheres created by man-made products have to be considered in a study of the destructive action of the atmosphere.

Mr. Townsend reported that the wider ranges of environment are now under study in the laboratory. Fungus growth, humidity, corrosion, salt coatings, ozone, dust and sand blasts have been brought into the laboratory for investigation. Static strains, impact loading, rapid acceleration, explosive loading, vibration, low and high pressures and high G's are under regular observation, often in novel equipment of impressively large size. And the laboratory is, of course, still concerned with the problems of heat and cold.

Mr. Townsend showed pictures of many pieces of equipment used by his own organization to simulate environmental factors and isolate them for study. Perhaps those that are least likely to be met in ordinary metallurgical practice are the rocket-driven impact sled, the rocket-driven centrifuge and the explosion chamber that tries equipment within the blast itself. — **Reported by H. E. Strauss for Washington.**

Calumet Hears Outline For Operations Research

Speaker: Edward C. Varnum
Barber-Colman Co.

Members of the **Calumet Chapter** heard Edward C. Varnum, director of operations research, Barber-Colman Co., speak on "Operations Research" at a recent meeting.

Mr. Varnum defined operations research as the application of mathematical and related scientific principles to management problems. Operations research as a distinct field began in England during World War II. After radar defense apparatus had been developed, a group of mathematicians, some of them from the United States, was organized to determine the most effective locations for the equipment by statistical studies.

The operations researchers' approach has since been applied to such diverse management problems as market forecasting, inventory control, production scheduling and equipment replacement.

A number of educational institutions, among them Brown University and Case Institute of Technology, have done work in this rapidly expanding new field.—**Reported by Thomas B. Linn for Calumet.**

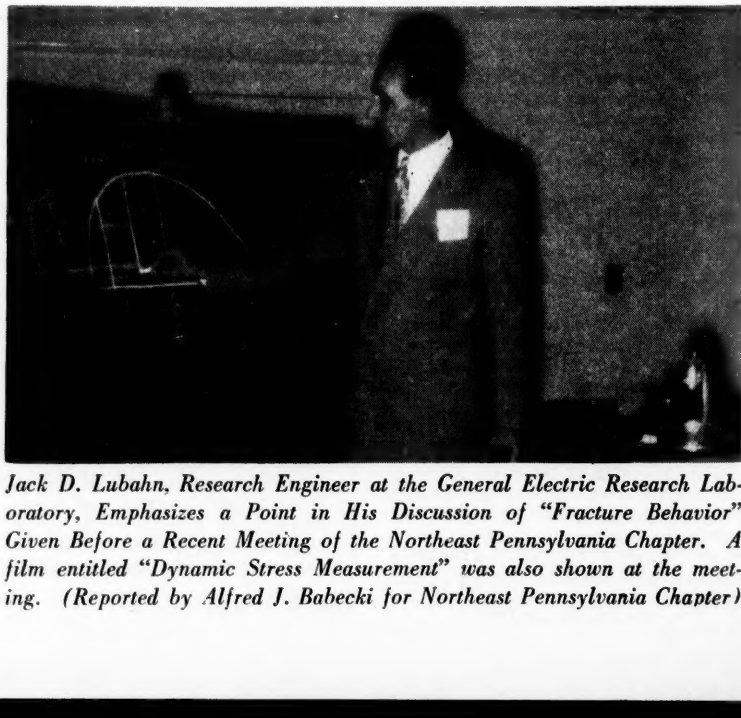
Speaks on Forging Practice

Speaker: Waldemar Naujoks
Globe Forge, Inc.

Waldemar Naujoks, general manager, Globe Forge, Inc., presented a discussion on "Forging Practice" at a meeting held recently by the **Syracuse Chapter.**

Mr. Naujoks, whose father was one of the pioneer forgemen of Europe, explained the early history of commercial forging operations in both Europe and the United States, and pointed out the many changes in work produced and materials used to produce forgings he has noted over his many years of experience in the forging field.—**Reported by L. L. McArthur for Syracuse.**

Diagrams Fracture Behavior



Jack D. Lubahn, Research Engineer at the General Electric Research Laboratory, Emphasizes a Point in His Discussion of "Fracture Behavior" Given Before a Recent Meeting of the Northeast Pennsylvania Chapter. A film entitled "Dynamic Stress Measurement" was also shown at the meeting. (Reported by Alfred J. Babecki for Northeast Pennsylvania Chapter)

New Films

Production Band Machining

A technicolor film which shows how machining jobs formerly accomplished with present, accepted methods can be far more rapidly accomplished through the new band machining technique. This technique deals with the removal of metal in sections rather than through the process of reducing unwanted metal to chips and through the use of simple fixtures requiring no time-consuming hold-downs and clamps. The film may be borrowed by writing to: DoAll Co., 254 North Laurel Ave., DesPlaines, Ill.

Corrosion in Action

A 16-mm. sound and color film prepared in three reels by the Corrosion Engineering Section of International Nickel Co., Inc., presents an explanation of corrosion and how to control it. Part One, on the "Nature of Corrosion, Anode and Cathode Processes", runs 20 min., Part Two, on the "Origin and Characteristics of Corrosion Currents", runs 26 min., and Part Three, on "Passivity and Protective Films", runs 17 min. One or all of the reels may be obtained for showing by writing to: International Nickel Co., Inc., Corrosion Engineering Section, 67 Wall St., New York 5, N. Y.

Nothing but the Best

A color-sound picture produced by Air Reduction Sales Co. on the Heliweld Process, this 20-min. movie tells the story of Airco's tungsten inert-gas arc welding process. A print of the film may be borrowed from any Air Reduction office or by writing Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y.

The Waiting Harvest

How once wasted smoke from coke ovens is now converted into a wealth of basic chemicals used in the manufacture of countless products is the subject of the film "Waiting Harvest" produced by U. S. Steel Corp. Prints of this 23-min., sound motion picture film may be obtained by writing: Motion Picture and Visual Aids Sections, Advertising Division, U. S. Steel Corp., 525 William Penn Place, Pittsburgh 30, Pa.

Land of Promise

The Cleveland Electric Illuminating Co. has produced a color-sound, 30-min. film depicting the advantages which the Cleveland-Northeast Ohio area offers to American industry in light of the expanded opportunities presented by the St. Lawrence Seaway. The film may be borrowed by writing to the Cleveland Electric Illuminating Co., 75 Public Square, Cleveland 1, Ohio, to the attention of John O. Gunn, manager of public relations.

Roberts Guest of New Orleans Chapter

"Powder Metallurgy of Alloy Steels" Was the Theme of the Talk Given by National President George A. Roberts Before the New Orleans Chapter. From left, rear, are: F. Ransom, J. Shilstone, Dr. Roberts and A. Trommershausen, secretary. Front, from left, are: Paul Raiford, vice-chairman, Perry Jones, chairman, and S. Faught. (Photograph by Gerald O'Neil)

Talks on High-Temperature Alloys Use

J. W. Freeman, University of Michigan, Presented a Talk on "Principles in the Use of Alloys at High Temperatures" at a Meeting Held by Los Angeles Chapter Recently. Present were, from left: Harold H. Block, educational committee chairman; Prof. Freeman; Mrs. Rebecca Sparling, technical chairman of the meeting; and S. R. Kallenbaugh, Chapter chairman

Speaker: J. W. Freeman
University of Michigan

Los Angeles Chapter members heard J. W. Freeman, research engineer, Engineering Research Institute, University of Michigan, discuss "Principles in the Use of Alloys at High Temperatures".

Prof. Freeman illustrated the type of complete design data needed to make an accurate evaluation of the proper material. These data would include such information as the combinations of time, temperature and stress which would produce known deformations and fracture. The cost and elapsed time required for such a series of tests are so great that they are very seldom completed for any one material. Prof. Freeman discussed a number of methods for safely extrapolating incomplete data. The advisability of cross-checking creep and stress rupture data prior to extrapolation was emphasized. He also covered mathematical functions which assist in the extrapolations.

The speaker touched on the factors in melting practice, heat treatment and microstructure which play a large part in high-temperature strength. Of interest was some data presented indicating an overlap in the strength scatterbands for carbon steels and austenitic steels at temperatures as high as 1100° F.—Reported by J. L. Waisman for Los Angeles Chapter.

created the Annual Teaching Award in Metallurgy, open to teachers of Metallurgy in the United States and Canada. Value $2000.

Lecture on Physics Of Solid State at New Jersey Course

The educational course given by the **New Jersey Chapter** featured "Advanced Metal Technology", and embraced the general subject of "Physics of the Solid State". Lecturers were C. E. Birchenall, James Forrestal Research Center at Princeton University, G. M. Pound, Metals Research Laboratory, Carnegie Institute of Technology, and A. H. Geisler*, Research Laboratory, General Electric Co.

In the first lecture on "Diffusion in Solids", Dr. Birchenall gave a brief resume of the historical development. He estimated that official recognition of the phenomenon occurred about 1935 from the work of Kirkendall.

Solid-state diffusion is believed to be based on the following mechanisms: interchange of two neighboring atoms; atom migration to an interstitial position leaving a vacancy; and atom migration into existing vacancies. The latter process is the most probable. The methods used to determine diffusion rate are autoradiography, etch limit technique for $Ag(NH_4)_2S$, and field emission microscopy.

Major problems as yet unanswered in the field of solid-state diffusion are the amount of supersaturation necessary to saturate a system, and mechanisms for other systems besides face-centered cubic and hexagonal close-packed.

Dr. Pound spoke on "Nucleation and Growth". He explained that these are rate processes, which may occur either close to or far from equilibrium.

From the general equation for nucleation, which occurs far from equilibrium, it is possible to calculate the minimum free energy per atom required for nucleation to occur, or the critical radius of the nucleus, at a given temperature. This required free energy is analogous to an energy barrier that becomes lower as the temperature is lowered.

Statements about the phenomenon of growth are less supported by empirical data, but some pronouncements may be made. As in nucleation, an energy barrier must also be overcome. Whether the growth will occur by screw dislocation or by layers is a function of surface roughness and the supersaturation or supercooling.

Dr. Geisler's lecture on "Precipitation From Solid Solutions" was divided into two main parts: identification of structures; and correlation of precipitation with changes in physical and chemical properties.

When precipitation from a solid solution has produced maximum physical properties for that material, the precipitate is too small to be seen by microscopic means. To observe precipitation in a microstructure, the alloy must be over-aged. A typical structure can be exemplified by the Widmanstatten pattern. Initial sites of precipitation are usually along grain bounderies. Early stages of aging can best be observed by Laue X-ray patterns.

Dr. Geisler presented a number of slides illustrating changes in hardness with aging time, change in physical properties during aging, properties of various states of alloys and the sphere of influence with respect to strain or deformation for coherent and incoherent precipitates.

Localized and general precipitation were then discussed. The localized precipitation sites are in grain boundaries, in slip planes, in subgrain boundaries and in grain-boundary recrystallization. Localized precipitation can best be exemplified by natural aging whereas general precipitation is associated with artificial aging. Intergranular corrosion is associated with localized precipitation. Also, localized precipitation will create a loss in ductility. The depletion of the matrix in the grain boundaries for natural, early and fully aged conditions was illustrated, as was the change with aging time of the fracture strength, tensile and yield strengths of an aged alloy. —**Reported by H. B. Fernald for New Jersey Chapter.**

*(*Deceased, see item, p. 12*)

New Orleans Concludes Welding Series

Members of the New Orleans Chapter Heard L. D. Richardson, Eutectic Welding Alloys Corp., Wind Up the Educational Series on "Welding" With a Discussion on "Low Heat Joining Processes". In the photograph are, from left: Frank Ransom, educational series chairman; Sam Phillips; Mr. Richardson; Perry Jones, Chapter chairman; and Sherman Faught

The **New Orleans Chapter** presented its annual Educational Lecture Series on "Welding" at Tulane University. The series consisted of four lectures given by some of the top-notch welding authorities in the country.

Topics covered were: "Metallurgy of Welding" and "Basic Fundamentals of Gas and Electric Arc Welding", by Gerald M. Slaughter, Union Carbon & Carbide Co., Oak Ridge National Laboratory; "Mechanical Properties of Welded Metal" and "Some Welding Problems and Their Solutions", by Louis J. Larson, Allis-Chalmers Manufacturing Co.; "The Shielded Arc Process", "Inert-Gas Shielded Arc Consumable Electric Welding" and a high-speed color movie, "Metal Transfer in Sigma Welding", by Larry L. Kelly, Linde Air Products Co.; and "Maintenance Welding Using Low Heat Joining Processes", "New Developments in Arc Welding of Cast Iron" and "Brazing" by L. D. Richardson, Eutectic Welding Alloys Corp.

A comprehensive survey of each welding process was developed during the lecture series, resulting in a better understanding of the welding industry by those who attended the series.—**Reported by Frank O. Ransom for New Orleans.**

Roberts Speaks at Buffalo

Over 125 members and 16 past chairmen of the **Buffalo Chapter** heard National President George A. Roberts speak on "Toolsteels—New Developments and Applications".

The lecture included a brief survey of toolsteels and a discussion of the concept of wear resistance and toughness in these steels.—**Reported by A. E. Leach for Buffalo Chapter.**

Free-Cutting Steel Topic at Detroit

Shown at a Meeting Held in Detroit Are, From Left: V. L. Merta, Cadillac Motor Car Division, General Motors Corp., Technical Chairman, and A. G. Sturrock, Wyckoff Steel Co., Who Spoke on "Free-Cutting Steels"

Speaker: A. G. Sturrock
Wyckoff Steel Co.

At a meeting of the **Detroit Chapter**, A. G. Sturrock, manager of the metallurgical division, Wyckoff Steel Co., talked on "Free-Cutting Steels".

After detailing the development of the sulfur-bearing steels, which were on the market as early as 1903, Mr. Sturrock presented several important points for the consideration of those interested in free-cutting steels. The first was the concept of inclusion size and its influence on the mechanism of machining.

The speaker stated that long, stringy sulfide inclusions are much less effective in promoting unworked surface metal and clean surface finishes than short and thick inclusions. This point was re-emphasized several times during the review of other theories of the influence of sulfur on machining. He showed slides to indicate flowed metal at the cut surface in the presence of short, thick sulfides. To indicate that it was configuration and distribution rather than composition that effected this difference, Mr. Sturrock described an experiment in which the stringy sulfides had been agglomerated by high-temperature treatment; the net result was an improvement in machinability. Because of this influence of sulfide configuration in any given steel, composition and thermal and mechanical history are important. Globular sulfides are higher in manganese content, as evidenced by darker color of the inclusions as compared to stringy sulfides. Fairly pure manganese sulfide has a melting point about 3000°F.; this melting point decreases with iron content of the sulfide. Plasticity may be assumed to be related to melting point and, for this reason, the temperature of hot work will have an influence on the relative plasticity of metal and inclusions, and can influence the shape of inclusions in rolled stock.

A second point Mr. Sturrock made was that some of the early work on the influence of the work sensivity of ferrite had been overlooked in concern over the influence of the inclusions. In the words of McCloud, "Free-machining steels should be soft and brittle". This seeming incongruity is achieved in the more promising free-cutting steels by providing phosphorus and nitrogen to embrittle the ferrite, low carbon to retain low hardness and inclusions to interrupt the cut.

Mr. Sturrock outlined the method of production of leaded steels, then indicated some of the differences between sulfurized and leaded steels. Leaded steels show their advantage at much higher cutting speeds than are commonly used in production with sulfurized steels. Lead has been shown to improve wear resistance of steels as well as machinability. There is evidence that on cutting a resulphurized steel a layer of sulfide is formed on the tool. This sulfide layer tends to lower the friction between the chip and the tool. The mechanism by which lead lowers friction in cutting is not explained as no evidence of lead on the tool has as yet been found.

Mr. Sturrock answered questions regarding the use of free-cutting steels for cold heading, carburizing and heat treating. He also cited impact tests on hardened steel in which leaded steels compared favorably with unleaded steels and sulfur bearing steels did not prove as satisfactory.—**Reported by D. V. Doane for Detroit.**

Tells How Copper Is Removed From Steel

Speaker: F. C. Langenberg
Pennsylvania State University

In the first of a series of three lectures on "Steelmaking" held by the **Penn State Chapter,** Frederick C. Langenberg, department of metallurgy, Pennsylvania State University, presented a talk entitled "Removal of Copper From Steel".

Mr. Langenberg stated that the last 20 years have seen a gradual, continuous increase in the residual copper content of steel. This increase is due to the recycling of ferrous scrap and to the inability to remove copper from ferrous alloys by ordinary refining methods. The uses of copper as an alloying element were illustrated to emphasize that these uses accelerate the increasing residual copper content. The disadvantages of copper in steel for hot forming and deep drawing were described in detail.

Mr. Langenberg next discussed the removal of copper from copper-plated scrap. Some suggested methods for removing copper from solution in molten ferrous alloys, which had not been investigated by the speaker, were presented and reviewed as to practicality and thermodynamic feasibility. These methods were interdendritic flow, zone refining and the formation of a volatile copper compound.

The liquid immiscibility which exists in iron-copper-carbon alloys was described and the use of this relationship to reduce the copper content of high-copper melts discussed. Original data at high-carbon contents and over a temperature range of 1300 to 1700° C. were presented.

Mr. Langenberg next discussed liquid-liquid solvent extraction, and mentioned work done in Sweden and at the Pennsylvania State University with lead as the treating solvent. The thermodynamics of the distribution equilibrium of copper between iron and lead was presented, and comparisons were made between these results and calculated results obtained by determining activities from the phase diagrams.

The effect of carbon content on equilibrium was also considered and a brief description of the kinetics of the copper transfer made.

The possibility of removing copper by utilizing the affinity of copper for sulfur was critically reviewed by Mr. Langenberg, and use of solvent slags which remove both copper and sulfur described. The results of experimental work with sodium sulfide were also presented. Thus, Mr. Langenberg showed that copper could be removed from ferrous alloys in several ways, the economics of each method being dependent on the particular circumstances.—**Reported by Alex Simkovich for Penn State.**

Philadelphia Juniors Introduced to Titanium —The Metal to Ponder

Speaker: Hugh W. Cooper
Superior Tube Co.

Members of the **Junior Section of the Philadelphia Chapter** heard Hugh Cooper, Superior Tube Co., talk on "Titanium—the Metal to Ponder" at a recent meeting.

Titanium was introduced as a potential structural metal in 1946 by the U. S. Bureau of Mines. Production has grown rapidly and in 1954, 5250 tons of sponge was produced in this country.

The process most widely used today for the extraction of titanium from the ore, rutile, is the Kroll process. The ore is mixed with chlorine and coke to form titanium tetrachloride, which is then introduced into a vessel containing molten magnesium. The operation produces magnesium chloride and titanium, with an excess of magnesium. The vessel is then evacuated and the magnesium and magnesium chloride drawn off, leaving pure titanium.

Mr. Cooper stated that titanium may be welded to itself but welding titanium to dissimilar metals embrittles it so as to make the fabrication useless. However, titanium may be alloyed with other elements, such as carbon, aluminum, manganese, chromium, molybdenum, iron, vanadium and columbium. These alloying agents, in quantities not exceeding 10%, have resulted in alloys with tensile strengths in excess of 200,000 psi. Titanium does not creep under stress in the same manner as most metals. Data have shown that at room temperature, titanium creeps at a rather rapid rate, but that at temperatures from 200° F. to 700° F., the creep rate decreases. The reason for this phenomenon is not known at present but it is possible some strain aging may occur in this temperature range, or the mode of deformation may change with strain rate and temperature.

Mr. Cooper accompanied his lecture with various slides showing the fabrication of titanium sheet and the welding of titanium tubing.—**Reported by A. Craig Hood for Philadelphia-Junior Section.**

Testing Tempered Martensite Steel Subject at Birmingham

Speaker: L. P. Zick
Chicago Bridge & Iron Co.

At a recent meeting of the **Birmingham Chapter**, L. P. Zick, research engineer for the Chicago Bridge & Iron Co., presented an excellent talk on the "Testing of Tempered Martensitic T-1 Steels to Destruction".—**Reported by J. B. Templeton for Birmingham.**

Presents Wire Products Discussion

Leaders at the Wire Meeting Held by the Worcester Chapter Recently Included, From Left: Walter J. Nartowt, Technical Chairman; Howard W. Hindes, Superintendent, Washburn Co., Who Gave a Talk Entitled "Wire Products at Their Best"; and Joseph R. Carter, Johnson Steel & Wire Co., Inc. (Reported by C. Weston Russell for the Worcester Chapter)

The Inside Story of A. S. M.

A.S.M. activities are expanding in so many and in such diverse directions that many members are not familar with all of the new and progressive things that are being done to serve the nation's metals engineers. This new monthly column will describe some of the current and prospective activities engaged in by committees and individual members in cooperation with headquarters staff: Forthcoming issues will report the widespread accomplishments and future plans in the educational field.

Checked into what goes on and what it takes to come up with a masterpiece such as the Metals Handbook Supplement of '54.

First addition to the 1948 Metals Handbook, this 200-page collection of engineering information, scientific fact and metallurgical data that appeared in the special mid-year issue of *Metal Progress*, was actually a boiled-down version of thousands of pages of top-flight metallurgical harvest garnered by a whole string of committee meetings and the individual and combined efforts of 134 top-ranking men.

Twenty-four major committees met an average of twice each during the year 1954, worked on subjects about which the members were expert, produced reams of written pages on metals engineering, costs, best uses of metals and alloys, application data and production aids.

Members of the committees came from all over the land, from the west and east coasts and way-stations in between. Most of them hold executive jobs with big industries; some are professors or government men in technical posts. The miles traveled by all committee members would have reached many times around the world.

Planning, detailing, keeping members alerted to meetings and to what subjects they were to have prepared for discussion at those meetings, and keeping records of committee proceedings was handled with skill by three ASM staffers—Taylor Lyman, editor of Metals Handbook, Carl Gerlach, staff engineer, and Jim Hontas, staff metallurgist.

The first Metals Handbook Supplement appeared in a mid-summer special edition of *Metal Progress*—an issue which made a deep and lasting impression upon thousands of metals engineers in the nation—and upon lots of smart advertisers who took space. The supplement was offered for sale as a reprint between covers of *Metal Progress*—later between hard covers at a slightly increased cost. Copies are still available to latecomers.

Right now, about 30 more committees are hard at work on as many subjects for another fine Metals Handbook Supplement. This new group of subjects, like last year's, is destined eventually for the next jumbo edition of the Handbook, and will first see the light of day in type about mid-August in another special issue of *Metal Progress*.

Unlike some committee meetings, these are sober, intent and fruitful sessions. The members arrive at the meeting city armed with bales of facts, figures, proof-in-performance notes and whatever else it takes to get things moving swiftly and keep them on the right track. In some meetings lasting only one day, a committee operating with know-how and wasting no time can go through an agenda of 56 technical items (the record to date). C.S.

Discusses Tool Failure Fundamentals

J. Y. Riedel, Toolsteel Engineer at Bethlehem Steel Co., Discussed "Tool Failures and Their Causes" at a Meeting Held Recently by the New Jersey Chapter. Shown at the speaker's table are, from left: Chapter Secretary H. F. J. Skarbek, Past-Chairman W. H. White, and Mr. Riedel

Speaker: J. Y. Riedel
Bethlehem Steel Co.

J. Y. Riedel, toolsteel engineer for Bethlehem Steel Co., guest speaker at a meeting of the **New Jersey Chapter,** spoke on "Tool Failures and Their Causes".

All tool failures are traceable to errors in the application of five basic factors, according to Mr. Riedel. These are: design; grade of steel; heat treatment; grinding; and application or use of the tool. Thorough investigation has revealed that tool failures are always related to a deficiency in one or more of these factors.

Design faults usually involve drastic changes in section or sharp corners. These errors may cause failure either during heat treatment or in service.

Examples of design faults which affect only service are improper clearances and high unit stresses due to underdesign.

Selecting the correct grade of steel imposes less of a problem today than it did in the past. The alloys market offers more than one from its store that provides correct hardness, toughness or a combination of these properties for any job. The effort toward universally accepted standard toolsteels has gradually been developed and the S.A.E. classifications now in use are the beginning of a clearer understanding of this basic factor.

While heat treatment of toolsteels presents numerous difficulties, Mr. Riedel pointed out that the most common error in this process is the failure to temper immediately after quenching and while still in the temperature range of 150 to 200° F. Failure to observe this simple rule has resulted in the scrapping of countless otherwise perfect tools.

The grinding of toolsteels, if performed so as to generate excessive heat gradients, will produce cracks in the surface of the tool by adding to the already high residual stresses produced by the hardening treatment. Because of their fineness these cracks may not be visible to the naked eye and can be seen only after the tool has failed. Their detection can be accomplished by the proper use of magnetic particle inspection or acid etching. Once found, cracks can often be successfully removed by careful regrinding.

Of the large number of service conditions that can cause tool failure, the most common is overloading. A typical condition is the use of tool on material heavier or harder than that for which it was designed. Analysis of service failures may require examination of the stock being worked as well as the tool.

Mr. Riedel concluded by presenting slides illustrating typical examples of the factors affecting tool failures. He stressed the fact that a failure resulting from a deficiency in any one of these factors can be remedied only by changes in the specific factor and cannot be corrected by changing any of the other factors. Copies of the "Tool Steel Troubleshooter" publication were distributed to those attending the meeting.—**Reported by E. L. Novomesky for New Jersey.**

Notre Dame Hears Talk on High-Temperature Alloys

Speaker: Hiram Brown
Solar Aircraft Co.

Members of the **Notre Dame Chapter** recently heard Hiram Brown, chief metallurgist, Solar Aircraft Co., give a talk on "High-Temperature Alloys".

Mr. Brown's talk covered the in-plant applications of the super alloys as well as the laboratory evaluations of same. He discussed mill defects encountered at Solar and their effect on plant production.

Laboratory testing was discussed and special mention made of the effect of ratio of speed of tensile testing and its effect upon properties of the material tested. The speaker noted that standard A.S.T.M. test specimens must be used and close attention be given to the prescribed specimen dimensions. In some of the materials, due to notch sensitivity and rapid work hardening, specimens must be made slightly oversize and then ground and polished to final dimensions. Also, grinding and polishing must be done longitudinally—not across the specimen.

Grain size control is very important in these alloys. Large grain material can result in the so-called "orange peel" after forming. Small grain materials are particularly prone to develop strain gradients during forming, which may be critical for certain temperatures and localized grain growth may occur. This condition may cause cracking during subsequent forming of that area.

The outstanding part of Mr. Brown's talk was his discussion of the work done at Solar on the effect of grain boundery carbide networks. After extensive laboratory testing Solar developed the Carbide Precipitation Chart for Austenitic Stainless Steel.

Mr. Brown stated that these high-temperature alloys are hungry for carbon and will pick it up from many sources. Careless gas welding may lead to trouble in this regard. Zinc contamination causes cracking in many stainless steels, particularly if the parts are heat treated with zinc left on them.

Heat treating, descaling after heat treatment and stress corrosion were also described by the speaker.—**Reported by R. C. Pocock for Notre Dame Chapter.**

Presents Description of High Speed Steels at Rome

Speaker: H. G. Johnstin
Vanadium-Alloys Steel Co.

H. G. Johnstin, metallurgical engineer, Vanadium-Alloys Steel Co., spoke on "High Speed Steels" before a meeting held in **Rome.**

Mr. Johnstin's talk centered on two basic groups of high speed steels, and he discussed the various types in each classification.

He also discussed the abrasion properties of various alloys as a means of comparing wear resistance for different compositions.

Other highlights of Mr. Johnstin's talk were descriptions of the performance of alloy tools at high temperatures, toughness as indicated by several different tests and the optimum tempering procedures for specific difficult applications such as tapping and thread chasing.—**Reported by J. M. Thompson for Rome.**

Penn State's Dr. McFarland Dies

David F. McFarland, long-time head of the department of metallurgy, Pennsylvania State University, died suddenly in February at the age of 76.

David Ford McFarland was born in Mansfield, Ohio, in 1878. He grew up in Lawrence, Kans., where he attended public school, and where, in 1900, he received the A. B. degree in chemistry at the University of Kansas. He joined the chemistry department of the University at once,

D. F. McFarland

remaining as instructor or assistant professor until 1910. During this period, he acquired the A.M. degree at Kansas in 1901, the M.S. at Yale in 1903, and Ph.D. at Yale in 1909. Simultaneously he served as chemist and geologist with the University Geological Survey of Kansas from 1899 to 1908. The latter connection led him, in collaboration with H. P. Cady, to the discovery of helium in natural gas (1903) and the development of a method of extracting the helium.

Dr. McFarland's long activity in metallurgy began in 1904 when he was assigned to teach metallurgy courses at the University of Kansas. With characteristic devotion to his obligations, he spent the next summer in intensive study of the new technology and in extensive travel to observe a variety of metallurgical operations. His study and teaching of metallurgy continued throughout the remainder of his Kansas years.

In 1910, Dr. McFarland moved to the University of Illinois, to remain for 10 years as assistant professor or associate professor of applied chemistry, rendering additional service as chemist or as metallographist in the Engineering Experiment Station.

From 1920 until his retirement in 1945, Dr. McFarland served Pennsylvania State University as professor and head of the department of metallurgy. He was acting dean of the College of Mineral Industries in 1922 and again in 1927-28.

He was a member of the American Chemical Society, the American Institute of Mining and Metallurgical Engineers, the Institute of Metals (Britain), and the Illinois Academy of Sciences, and was continuously a member of A.S.M. from 1920 until his death. He was listed in "American Men of Science" and in "Who's Who in Engineering" and was a Fellow of the American Association for the Advancement of Science.

In 1948, the Penn State Chapter of the American Society for Metals, in a gesture of honor to this gentle and widely loved teacher, gave his name to the Chapter's David Ford McFarland Award for Achievement in Metallurgy, which is given annually to a metallurgist alumnus of the Pennsylvania State University who has honorably distinguished himself in his profession.

Dr. McFarland is survived by his wife, Martha, and four children.

To Open School of Nuclear Science at Argonne Laboratory

A School of Nuclear Science and Engineering will open for a seven-month course in March 1955 at Argonne National Laboratory. The School will present courses in scientific and technical knowledge about nuclear reactors and related atomic energy applications which can presently be made available by the A.E.C. on an unclassified basis, and is set up to serve engineers and scientists from both the U. S. and abroad.

The first course is designed for beginners in the field. It is particularly applicable for scientists and engineers from American industries which have not been actively engaged in atomic energy work and from interested countries abroad which are just embarking on nuclear energy programs.

The School will present material on the production of reactor materials, the design, construction and operation of research reactors, the equipment and procedures for carrying out research in the field of nuclear energy, the handling of irradiated materials, utilization of radioactive products of reactors, and the principles of design, construction and operation of nuclear power plants. Regular classroom discussions and laboratory work will be presented during the first four months of the course. Students will then be assigned in groups and will spend three months on the design of research or materials testing reactors. Teaching will be conducted by a full-time staff, aided by members of the Laboratory's research and development staff. Specialists from A.E.C. installations will be asked to give special lectures.

A second course is scheduled to begin in October 1955, to consist of five months of classroom and laboratory work and four months of group work on design of reactors.

Further information about these courses may be obtained from: Argonne National Laboratory, Lemont, Illinois.

Quebec Visits Brewery

Members of the newly organized Quebec Chapter were guests of the Dow Brewery during a recent meeting. The plant visit provided an opportunity for the members of this new chapter to become acquainted with each other.

During the evening, a film, "Iron Ore in 1954", showing the tremendous amount of work required to bring the New Quebec iron ore deposits to the production stage, was shown.

Alfred Geisler Dies

Alfred Hollis Geisler, research associate in the metallurgy department, General Electric Laboratory in 1946, tory, died at Schenectady in December after a brief illness. He was 38 years old.

Dr. Geisler was born in Pittsburgh, where he attended the public schools and Carnegie Institute of Technology, receiving a B.S. degree in 1938 and a D.Sc. in 1942. Before joining the General Electric Laboratory in 1946, he was a senior research metallurgist at the Alcoa Research Laboratories.

A. H. Geisler

His work as a physical metallurgist was widely recognized in the fields of alloy transformations, X-ray and neutron diffraction, metallography and electron microscopy. He authored more than 35 technical papers, one of which won an A.I.M.E. Mathewson award as the outstanding Institute of Metals Division paper in 1943. Significant contributions were made by him to the science of precipitation hardening, martensite, permanent magnet alloys, crystallography and pole figures. He was an influential member of the joint committee that formulated the ASM-SLA Classification of Metal Literature in 1950.

He was a member and committee worker in the American Society for Metals, American Institute of Mining and Metallurgical Engineers, American Crystallographic Association, and the American Society for Testing Materials. He was a member of Sigma Xi. In Schenectady he was affiliated with Union Presbyterian Church and was active in Cub Scout work.

Surviving are his wife, the former Martha Donald of Pittsburgh, and two sons, Donald R., 11, and Alfred H., Jr., 9.

Sustaining Members Hear Talk on Gray Iron

Present at the Chattanooga Chapter's Sustaining Members' Night Meeting Were, Seated, From Left: Frank Gray, Chattanooga Boiler and Tank Co.; Chairman Ab Flowers, Combustion Engineering Co., Inc.; Technical Speaker T. W. Curry, Lynchburg Foundry Co.; J. W. Henderson, Vance Iron and Steel Co.; and G. T. Richardson, Noland Co. Standing, from left: Charles Saunders, Tennessee Products and Chemical Corp.; P. H. Stuff, Ross-Meehan Foundries; S. C. Northington, Combustion Engineering, Inc.; Elder Jones, Siskin Steel and Supply Co.; and F. B. Whitice, O'Neal Steel Co. (Photograph by W. L. Dearing for Chattanooga)

Speaker: T. W. Curry
Lynchburg Foundry Co.

The **Chattanooga Chapter** observed Sustaining Members Night by introducing representatives of the sustaining member companies, and presenting certificates in recognition of their support of the Chapter.

Sustaining members are: Frank Gray, Chattanooga Boiler and Tank Co.; J. W. Henderson, Vance Iron and Steel Co.; G. T. Richardson, Noland Co.; Charles Saunders, Tennessee Products and Chemical Corp.; P. H. Stuff, Ross-Meehan Foundries; S. C. Northington, Combustion Engineering, Inc.; Elder Jones, Siskin Steel and Supply Co.; F. B. Whitice, O'Neal Steel Co.; M. L. Holt, Chattanooga Welding and Machine Co.; C. L. Jones, Mills and Lupton Supply Co., and T. L. Dorsey, Industrial Supply Co.

T. W. Curry of the Lynchburg Foundry Co. spoke on the "Present-Day Gray Iron Foundry". Mr. Curry gave May 1948 as the starting point in the modern development of cast iron when the two methods of making nodular cast iron by the addition of cerium and by using magnesium as the alloying agent were announced. Modern molding methods were given impetus in 1946 by the finding, in occupied Germany, of full particulars concerning the shell molding process.

The nodular cast iron processes made foundrymen realize the importance of chemistry control. All elements already held to a maximum must continue to be controlled, as well as titanium, copper, lead, tin, chromium, arsenic, vanadium, nickel and molybdenum, since these elements have an inhibiting effect upon the formation of the graphite nodule or vary the physical properties from the desired result. The spectrograph and spectrophotometer moved into the cast iron foundry laboratory.

The importance of sulfur in the conversion to nodular iron was realized and development of methods for reducing sulfur began. Lynchburg's approach has been through methods of injecting calcium carbide and the building of water-cooled cupolas to utilize a basic slag and try to create a reducing atmosphere within the cupola.

Mr. Curry showed, by means of slides, the development through several trial cupolas of Lynchburg's present melting equipment. Changes in refractory support methods, tuyeres arrangement, angle of deflection and size of tuyeres were shown, as were developments in the injector mechanism for calcium carbide.

The modern cast iron foundry must couple shell molding with this new metallurgy, and Lynchburg has developed methods for shell molding which have a capacity of 150 tons per 20-hr. day.—**Reported by J. H. McMinn for Chattanooga.**

Schedule Southern Metals Conference on Metallurgy

The theme of this year's Southern Metals Conference, the tenth annual technical conference to be sponsored by the southern chapters of the American Society for Metals, will be the "Production, Fabrication and Application of Metals". The tentative program, featuring six technical speakers, is in the process of being set up. Two of the talks will be on titanium and other subjects will include welding, heat treating and toolsteels. Technical sessions will be held in the mornings, and plant tours will be taken in the afternoons.

The Conference will be held at the Lookout Mountain Hotel in Chattanooga, Tenn. from June 1 through June 3. A complete schedule of the conference will be printed as soon as definite speakers are obtained.

Holds Ladies Night Meeting

The annual Ladies Night Meeting of the **Western Ontario Chapter** was held at the Cobblestone Inn in London. Dave Kennedy, Lyman Tube and Supply Ltd., acted as chairman and presented each lady with a corsage on arrival. There was a cocktail hour, followed by dinner and dancing, and, although weather conditions were not the best, many members traveled over 100 miles to attend.—**Reported by W. F. Clinton for Western Ontario Chapter.**

To Receive Penn State's David McFarland Award

The **Penn State Chapter** has announced the selection of John A. Succop as the 1955 recipient of its annual David Ford McFarland Award. Mr. Succop, chief metallurgical engineer, Heppenstall Co., will receive the award during a dinner meeting to be held in April. Mr. Succop will deliver a technical address entitled "Development of a Die Block for Closed Die Forging".

After graduating from Pennsylvania State College in 1917, Mr. Succop spent two years with Mesta Machine Co., resigning in 1920 to join Heppenstall, where he has been since. His metallurgical activities have played a large part in the growth of the company in the metallurgical production of alloy steels. Although he started as assistant foreman in the heat treat department, he was soon transferred to the metallurgical department. He was appointed metallurgical engineer in 1921 and in 1926 became chief of research, in charge of all metallurgical and research activities at the company. In 1944, with the inauguration of a separate research department and laboratory, he was appointed chief metallurgical engineer, the position he holds at the present time.

J. A. Succop

Mr. Succop has contributed much to the development of alloy steel die blocks for drop forging and press forging in closed dies. His patented analysis for Hardtem die block steel has become one of the standards for closed die forging throughout the world. He has a patent pending for a new grade of material called "Prestem", which he devised for closed die forging.

Mr. Succop has contributed in many ways to the production of various heavy forged machinery components and he is one of the leaders in the production of modified stainless steels and super-alloys for high-temperature applications.

Friends of "Jack" Succop and the Penn State Chapter, and all A.S.M. members, are invited to make reservations for this dinner meeting with W. J. Reagan, Division of Metallurgy, College of Mineral Industries, Pennsylvania State University, University Park, Pa.

Chicago Juniors See Film

A movie, "Steel Frontiers", produced by the Republic Steel Corp. was the feature of a meeting held recently by the Illinois Institute of Technology Chapter.—**Reported by A. W. Merriam, Jr.**

Panel on Solders and Fluxes in N. Y.

Shown During a Meeting of the New York Chapter Are Speakers, From Left: E. J. Minarcik, National Lead Co. Research Laboratories; David M. Borcina, Lead Industries Association; Fred Disque, Alpha Metals, Inc.; and Carl Sohl, American Smelting & Refining Co. The speakers comprised a panel of experts who spoke on "Developments in Solder and Fluxes"

American industry has consumed an average of 100,000 short tons of soft solder each year since 1947, representing an increase of approximately 65% over that used during World War II and approximately 2½ to 3 times that required during the 1930s, declared David M. Borcina of the Lead Industries Association. He pointed out that such growth is a good indication of how the use of solder has kept pace with the industrial growth of the nation.

Mr. Borcina spoke as moderator of a panel discussion on "Developments in Solder and Fluxes", the subject of a recent meeting of the **New York Chapter.**

Two major users of solder are the automobile and canning industries, each consuming between 20 and 25% of the yearly total, he said. Others are in the fields of communication, construction and electrical, plus a host of other industries that require in their manufacturing processes a simple and inexpensive method of bonding metal to metal.

One of the interesting developments discussed by the panel has been the trend to higher lead content soft solders that began during the war years. This trend has been due largely to the perfection of new soldering techniques and fluxes which made it possible for these lower cost solders to perform as well as the pre-war solders.

Newly developed organic - type fluxes are being used extensively in the manufacture of both tubular and cellular-type automobile radiators, declared E. J. Minarcik, National Lead Co. Research Laboratories. He discussed advantages of the organic-type fluxes, pointing out that they do not leave corrosive residues, which always present a removal problem when using zinc chloride-type fluxes.

The perfection of multiple-cored wire solders in which the flux is located nearer the surface and more uniformly spread over the cross sectional area was discussed by Fred Disque, Alpha Metals, Inc. He also described a method of construction that provides for rapid release and more efficient fluxing action. The use of low-temperature solders in electronic equipment where component parts are easily damaged by excessive heat was also highlighted.

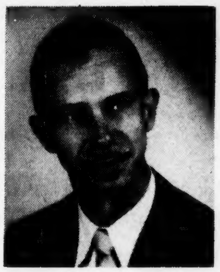
New end-uses, with special emphasis on printed circuits, were covered by Carl Sohl of the American Smelting & Refining Co. Research Laboratories.

Detroit Educational Series On Heat Treatment of Steel

The **Detroit Chapter** has recently completed a series of educational lectures on the "Heat Treatment of Steels". The course, primarily intended for those working in, or connected with, the metal industry who desire a better understanding of the principles and applications of heat treatment, included the following:

"Fundamentals of Steel Heat Treatment", by C. A. Siebert, professor of metallurgical engineering, University of Michigan; "Heat Treating Processes", by W. C. Truckenmiller, associate professor of production engineering, University of Michigan; and "Practical Heat Treating Problems", by L. A. Danse, formerly assistant to the director, production engineering, General Motors Corp.—**Reported by K. F. Packer for Detroit.**

Meet Your Chapter Chairman



R. W. E. Leiter

W. E. Borin

P. C. Jones

PHILADELPHIA

RALPH W. E. LEITER, assistant chief metallurgist, Budd Co., was born in Hagerstown, Md., and graduated from Juniata College in 1927 with a B.S. degree and from Harvard Engineering School in 1928 with a M.S. degree. He received a D.S. degree from Harvard in 1930.

Ralph's first job out of school was in the gas analysis of steel. He subsequently worked as a research and production metallurgist in low carbon steel forming before joining Budd.

Ralph is married and has two girls, 15 and 19 years of age. He is a member of A.I.M.E. and has served on many committees of the Philadelphia Chapter, A.S.M. as well as on the Howe Medal Award committee and the National Handbook committee.

Ralph's spare-time interests are golf, gardening and travel.

NEW ORLEANS

PERRY C. JONES was born in Bessemer, Ala., in 1921. He graduated from Hueytown High School in 1939 and entered the University of Alabama in 1941. He enlisted in the Army in 1943 and saw combat service in Europe with the 87th Infantry Division, and was awarded a Purple Heart Medal for wounds received in action.

After his discharge from the Army in 1945, he returned to the University of Alabama and graduated in 1948 with a B.S. degree in metallurgy. After his graduation he served as a metallurgist for a producer of gray iron castings in Birmingham, and in 1951 assumed his present position as metallurgist for Rheem Manufacturing Co. He has been a member of A.S.M. since 1946 and aided in the organization of the New Orleans Chapter.

Perry is married and he and his wife, Helen, have two children, William, age 7, and Frances, age 1. His favorite spare-time activities are hunting and fishing.

TEXAS

ARTHUR ROBERT (Bob) OAKLEY, JR., was born in September 1920 in Union Hill, N. J. He graduated with a B.S. degree in chemistry and metallurgy from Lafayette College in 1942. He played varsity baseball, soccer and basketball at school.

Bob's first job was as a junior research chemist for Shell Oil Co. at the Houston refinery. Later he was employed as a chemist for the Sheffield Steel Co., and for the past nine years he has been sales metallurgist for Steel and Machine Tool Sales Co.

Bob and Margery, his wife, have two sons, Bobby and Jimmy, ages 10 and 7½. He is a member of the American Chemical Society, the Houston Engineers' Club, Golfcrest Country Club and the Houston Engineers' Council. He is presently a member of the National Handbook Committee A.S.M.

Bob's hobbies are mostly athletic. He has been a Southwest Conference basketball and football official and manages to keep his golf game well within the 70's besides attending all kinds of sporting events. He also coaches a Little League Baseball Club.

ONTARIO

MURRAY N. TALLMAN, plant manager, A. H. Tallman Bronze Co. Ltd., was born in Hamilton, Ontario, and attended Queen's University in Kingston. His first job was in a foundry.

Mr. Tallman is married and has one boy. He is a member of the A.F.S. and the Engineering Institute of Canada, as well as the Ad and Sales Club. His hobbies are golf and fishing.

HARTFORD

WALTER E. BORIN, engineer of tests for the Underwood Corp., graduated from Trinity College in 1940 with a B.S. degree in chemistry. His first job was as an industrial chemist.

Mr. Borin served with the Corps of Engineers, U. S. Army, in the European Theater during World War II. In addition to his chairmanship in the Hartford Chapter, he has served on the Chapter's executive committee since 1946. He is a member of A.S.T.M. and the Electrochemical Society, and is active in the American Legion and the Connecticut State Militia.

While he would deny any great proficiency in the art, it is apparent that a home workship affords Walt considerable recreation during the winter evenings. The basement of his comfortable home in Manchester, Conn., where he and his wife live, offers ample evidence to support this fact. During the summer, Walt occasionally finds time for an afternoon of golf.

ALBUQUERQUE

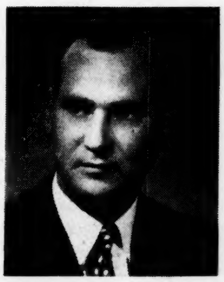
JOHN L. ABBOTT was born at Fairfield, Idaho, in 1913. He studied at the University of Idaho and received his degree in metallurgy from Colorado School of Mines in 1941. His first job was senior metallurgist and welding engineer for Wright Aeronautical Co. He then entered the field of X-ray diffraction and was with North American Phillips Co. and A. O. Smith Co., and since 1952 he has been metallurgical engineer for Sandia Corp., a Bell Laboratories company operated for the Atomic Energy Commission.

Jack is married and the Abbotts have three daughters whom he takes rock hounding, hunting, fishing and camping, all hobbies he enjoyed as a youth in Idaho. In addition to his family, Jack is proud of his home building activities, having completed one in Milwaukee the day he left and one already completed in Albuquerque.

He has been an A.S.M. member since 1938 and his efforts were largely responsible for the organization and founding of the recently formed Albuquerque Chapter.

J. L. Abbott

M. N. Tallman



A. R. Oakley, Jr.

Metallurgical News and Developments

Devoted to News in the Metals Field of Special Interest to Students and Others

A Department of *Metals Review*, published by the
American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio

Aluminum Plant — American Brass Co., a subsidiary of Anaconda Copper Mining Co., will begin construction on an integrated aluminum mill on the outskirts of Terre Haute, Ind., soon. Annual production from this mill is expected to be 60,000 tons of ingot aluminum.

Kaiser Builds — The Chemicals Division of Kaiser Aluminum & Chemical Corp. will build a $4-million plant to produce basic refractories in Columbiana, Ohio. Construction will begin early in April and is scheduled to be completed and in operation by the end of the year.

Distributor Named — Burrell Corp. has been appointed exclusive distributor for Castor-Severs extrusion rheometers. These new instruments measure the viscosity of coatings, adhesives, pastes and plastisols under high-speed processing conditions in plant and laboratory.

Buys Plant — Baldwin-Lima-Hamilton Corp. has announced the purchase of the 45-year old Madsen Iron Works, Inc., Los Angeles County, Calif., one of the nation's foremost manufacturers of heavy road-construction machinery.

Metallizing Process — A new high-speed process of metallizing plastic film results in materials having superior metallic adherence, and capable of being metallized in very wide widths, is being manufactured by National Metallizing Corp.

Resin Coating — Better protection for surfaces exposed to humid and corrosive atmospheres is possible with Thick-Coat, a new resin coating product developed by the Pennsylvania Salt Mfg. Co. The Thick-Coat system provides durable protective coating for new or corroded metal, concrete and wood equipment and structures or surfaces exposed to fumes, corrosive chemical laden atmospheres or spillage of corrosive chemicals. It has excellent flow qualities and is applied like regular paint.

To Build Reactor—A contract for the design, engineering and construction of a nuclear reactor has been awarded by Battelle Memorial Institute to the American Machine & Foundry Co. One of the first in the country to be owned and operated by a private organization, the reactor will be a key component in a $1½-million atomic research center Battelle is building near Columbus.

Forms Aluminum Department — Federated Metals Division, American Smelting & Refining Co., has established a national aluminum department to unify the company's nationwide aluminum operations and to afford aluminum casting alloy consumers the advantage of maximum service.

Enamel on Ship—The U.S.S. Saratoga, newest of the Navy's supercarriers, now under construction in the Navy Yard at Brooklyn, will use 80,000 sq. ft. of porcelain enamel on aluminum, supplied by Seaporcel Metals, Inc. The light-weight material will be used on joiner bulkheads, pilasters and partitions and will minimize chipping and repainting tasks, as well as substantially reduce the hazards of fire.

Carbon Steel — Production of custom-made extruded carbon steel sections by the Ugine-Sejournet process has begun at Jones & Laughlin Steel Corp.'s new hot extrusion plant in Pittsburgh. Main production of the plant will consist of complex sections that cannot be rolled, with small tonnages of rollable special sections for which rolling is uneconomical.

Torsion-Tester — A 200,000 in.-lb. torsion testing machine which loads and indicates torque in both directions of rotation has been announced by the Tinius Olsen Testing Machine Co. The tester eliminates the necessity of taking down a specimen or readjusting grips in order to get the full range of twist and pressure.

Milling Cutters — Standard stagger-tooth side milling cutters and interlocking side or straddle mills in various sizes have been added to the Helicarb line of helical carbide milling cutters manufactured by Sonnet Tool & Mfg. Co. These cutters utilize the proven principle of the efficiency of a helical flute combined with the edge hardness of carbide.

Welding Program — The James F. Lincoln Arc Welding Foundation has announced the establishment of a $12,000 Machine Tool Design Award Program. Awards will be made for papers describing the use of arc welding in machine tool design. The program is open to all persons engaged in the design or making of metal cutting or metal forming machine tools. A total of 15 awards will be made, with a top award of $3000 and other awards of $2500, $2000, $1000 and ten awards of $200 each. Information may be obtained by writing: James F. Lincoln Arc Welding Foundation, Cleveland 17, Ohio.

AEC Microcards — A microcard edition of all unclassified reports of the A.E.C. will be made available on a subscription basis to those interested in building a complete library of research and developments in the atomic energy field. It is proposed to make a complete file of A.E.C. unclassified reports, from their beginning, and to make available copies of new technical reports a few weeks after they appear. Subscription forms may be obtained by writing: Microcard Foundation, Godfrey Memorial Library, Middletown, Conn.

New Plant Organ — Continental Foundry & Machine Co. has just published its first issue of *Continental*, a magazine to better acquaint employees, stockholders and customers with the company and its policies. Each quarterly issue will highlight one of Continental's operations.

Conference on Nuclear Engineering—The University of California's department of engineering has scheduled a three-day Conference on Nuclear Engineering, to be held on the Los Angeles campus from Apr. 27 through Apr. 29. Subjects will include "Water and Liquid Metals as Primary Working Fluids", "Boiling Water Reactors", "Radiation Sources for Industrial Applications", and "Power Reactor Control During Load Changes". Full information may be obtained from: University of California Extension, Los Angeles 24, Calif.

Corrosion Short Course—The Vancouver Section of N.A.C.A. is holding a corrosion short course on the campus of the University of British Columbia from Apr. 19 through Apr. 22. Topics will cover electrochemical and mechanical aspects of corrosion fundamentals, cathodic protection, coatings, water treatment, inhibitors and the importance of designing to prevent corrosion. Further information may be obtained by writing: Ian Berwick, Secretary, Vancouver Section N.A.C.A., British Research Council, University of British Columbia, Vancouver 8, B. C.

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Akron	**Apr. 20**	Mayflower Hotel	**David Holub**	Scrap; Steel Reborn
Alberta	**Apr. 19**	Al San Club	**B. M. Hamilton**	What Steel Shall I Use?
Baltimore	**Apr. 18**	Engineers Club	**S. O. Evans**	Hot Extrusion by the Sejournet Process
Birmingham	**Apr. 5**	Hoopers Cafe	**F. G. Tatnall**	Physical Testings of Metals
Boston	**Apr. 1**	M.I.T. Faculty Club	**Daniel Martin**	Oil Field Metallurgy
Calumet	**Apr. 12**	Phil Smidt's		Flat Rolled Steel and Tin Plate
	Apr. 16	Purdue University	**Regional Meeting**	Metallurgy of Welding
Canton-Massillon	**Apr. 5**	Mergus Restaurant	**E. V. Crane**	Heavy Presses
Carolinas	**Apr. 21**	Raleigh		Nucleonic Engineering
Cedar Rapids	**Apr. 12**	Hotel Roosevelt	**E. S. Rowland**	Practical Applications of Physical Metallurgy
Chicago	**Apr. 11**	Furniture Club	**F. T. McGuire and Panel**	Surface Hardening
Cincinnati	**Apr. 13**	Dayton	**Regional Meeting**	Tool Materials
Cleveland	**Apr. 4**	Hollenden Hotel	**A. R. Troiano**	Ultra-Strength Steels
Columbus	**Apr. 13**	Dayton	**Regional Meeting**	Tool Materials
Dayton	**Apr. 13**	Dayton	**Regional Meeting**	Tool Materials
Detroit	**Apr. 11**	Engineering Society		Young Fellows' Night
Eastern N. Y.	**Apr. 12**	Panetta's	**Bruce Chalmers**	Solidification of Metals
Fort Wayne	**Apr. 11**	Howard Johnson's	**D. W. Thompson**	Cybernetics
	Apr. 16	Purdue University	**Regional Meeting**	Metallurgy of Welding
Golden Gate	**Apr. 11**	510—17th St.	**C. E. Betz**	Nondestructive Testing Methods
Hartford	**Apr. 12**	Indian Hill	**B. L. Averbach**	Stability and Heat Treatment of Steel
Indianapolis	**Apr. 18**	McClarneys	**E. N. Skinner**	Alloys for High-Temperature Service
	Apr. 16	Purdue University	**Regional Meeting**	Metallurgy of Welding
Jacksonville	**Apr. 11**	C. I. Copps Co.	**Symposium**	Welding
Kansas City	**Apr. 20**	Wishbone Restaurant	**Dudley Grimm**	Metal Scrap
Lehigh Valley	**Apr. 1**	Hotel Traylor	**H. S. Avery**	Abrasion Resistant Alloys
Long Island	**Apr. 27**	Patricia Murphy's	**George A. Roberts**	Properties and Structure of Alloy Toolsteels
Louisville	**Apr. 5**	Kapfhammer's	**A. E. Focke**	Metallurgical Engineering in Applied Research
Mahoning Valley	**Apr. 19**	V. F. W.	**J. H. Frye, Jr.**	Materials Problems in Atomic Energy
Manitoba	**Apr. 14**	Marlborough Hotel	**B. M. Hamilton**	Steel Night
Milwaukee	**Apr. 19**	City Club	**Hiram Brown**	Aircraft Turbine Engines
Minnesota	**Apr. 21**	Hotel Normandy	**G. B. Peters**	Vacuum Die Casting Process
Montreal	**Apr. 4**	Queen's Hotel	**H. R. Neifert**	Fatigue Failures in Large Parts
Muncie	**Apr. 12**	Anderson	**N. Tisdale, Jr.**	Rare Earths in Iron and Steel
	Apr. 16	Purdue University	**Regional Meeting**	Metallurgy of Welding
New Haven	**Apr. 21**	Hotel Taft		New Developments in Silver Brazing
New Jersey	**Apr. 18**	Essex House	**A. R. Troiano**	Ultra-High-Strength Steels
New York	**Apr. 4**	Schwartz's	**A. Slachta**	Selecting High-Temperature Materials
Northwest Pennsylvania	**Apr. 14**	Irem Temple Country Club	**D. Carl Buck**	Metallurgical Aspects of Modern Stainless Steels
Northwestern Pennsylvania	**Apr. 21**	Warren		Zinc Die Casting
Notre Dame	**Apr. 13**	Engineering Bldg.	**Howart T. Clark**	Titanium
	Apr. 16	Purdue University	**Regional Meeting**	Metallurgy of Welding
Oak Ridge	**Apr. 20**	O.R.I.N.S.	**Carl F. Floe**	Surface Hardening
Ontario	**Apr. 1**	St. Catharines	**H. R. Neifert**	Why Metals Fracture
Ottawa Valley	**Apr. 5**	P.M.R.L.	**R. Smallman-Tew**	Metals and Alloys in Aircraft
Penn State	**Apr. 29**	Penn State	**John A. Succop**	Die Block for Closed Die Forging
Philadelphia	**Apr. 29**	Engineers Club	**I. W. Harter, Jr.**	Continuous Casting
Junior Section	**Apr. 11**	Engineers Club	**Arnold Rose**	Metallurgy of Welding
Pittsburgh	**Apr. 14**		**W. S. Pellini**	
Puget Sound	**Apr. 13**	Engineers Club	**R. E. Van Deventer**	Specifications Are Not Enough
Purdue	**Apr. 16**	Purdue	**Host—Regional Meeting**	Metallurgy of Welding
Rhode Island	**Apr. 6**	Eng. Soc. Bldg.	**Carlton Hastings**	Nondestructive Testing
Rochester	**Apr. 11**	Howard Johnsons	**R. J. Ulrech**	Application of Vacuum Metallurgy to Metallurgical Operations
Rocky Mt.	**Apr. 15**	Oxford Hotel	**Social**	Ladies Night
Rome	**Apr. 4**	Elks Club	**T. S. Fuller**	Alloy Development
St. Louis	**Apr. 15**	Stratford Hotel	**K. E. Rose**	Crystal Formation
Saginaw Valley	**Apr. 19**	Frankenmuth Hotel	**R. L. Mattson**	Effects of Residual Stress on Fatigue Life of Metals
San Diego	**Apr. 21**	Solar Auditorium	**R. E. Van Deventer**	Specifications Are Not Enough
Springfield	**Apr. 18**	Greenfield, Mass.	**G. A. Roberts**	High Speed Steels
Terre Haute	**Apr. 16**	Purdue University	**Regional Meeting**	Metallurgy of Welding
Texas	**Apr. 5**	Ben Milam Hotel	**O. E. Cullen**	Heat Treating Atmospheres
Toledo	**Apr. 14**	Buckeye Brewing Co.		Plant Visit
Tri-City	**Apr. 5**	Rock Island Arsenal	**D. A. Campbell**	Industrial Gas Burners
Warren	**Apr. 15**	Cleveland Plain Dealer		Plant Visit
Washington	**Apr. 11**	Naylor's	**E. A. Harris**	Light Metals and Defense
Western Ontario	**Apr. 6**	Cobblestone Inn	**H. F. Moorehead**	Aluminum Extrusions
Wichita	**Apr. 19**	K. of C. Hall		Chemical Meeting of Aluminum
York	**Apr. 13**	Gettysburg	**J. W. Cable**	

A. S. M. to Europe—Italy

Members of the American Society for Metals who are planning to attend the Joint Technical Societies Congress in Europe in June, are offered an important Post-Congress tour to Italy, arranged by the Associazone Italiana di Metallurgia. This tour will include the major industrial plants situated in the charming country of Northern Italy where they will be able to combine business with pleasure.

Leaving Paris on the famous Rome Express, visitors will go to Turin, the capital of Piedmont and the birthplace of the Italian motor industry. After a tour through the Fiat plant, one of the largest automobile factories in Europe, members and their wives will have time to enjoy the romatic and historic panorama of this ancient city.

The next stop is Ivrea, where the modern Olivetti factory is set in the midst of an otherwise agricultural center.

Members will then split into two groups, ferrous and nonferrous. The first group will go to St. Vincent, stopping for a visit at the Castello di Issogne, and from St. Vincent will go on across a fascinating valley to Cogne, a small industrial city. From Cogne, the first group will return to Turin to join the second group.

The second group will visit Stresa on Lake Maggiore, and Novara, where the Experimental Institute for Light Metals is situated, before returning to Turin.

The two groups will then proceed together to Genoa, the major port in Italy, and then, by bus, will go to Cornigliano for plant tours and sightseeing activities. On return to Genoa, plans for departure for Paris can be arranged.

Itinerary of Post-Congress Tour to Italy

June 19

7:55 p.m.	Departure from Gare de Lyon, Paris

June 20

8:36 a.m.	Arrive in Turin.
9:30	Award of Losana Golden Medal to W. Hume-Rothery, to be presented at the University of Napoli.
	Lecture by Dr. Hume-Rothery as part of a Symposium on Metal Alloys
	Ladies will visit Museo Civico
11:30	Reception at Palazzo Madama, Turin Town Hall.
3:00 p.m.	Plant tour of Fiat, to include ladies.
4:30	Group 1: Visit central laboratory, car and aircraft departments.
	Group 2: Visit steel works.
	Group 3: Ladies will visit Lenci, famous doll factory.
8:30	Dinner offered by Fiat, by personal invitation.

June 21

8:30 a.m.	Departure for Ivrea
9:30	Visit to Olivetti plant.
1:00 p.m.	Lunch offered by Olivetti, by personal invitation.
3:00	Ferrous Group A: Departure for St. Vincent with stopover at famous Issogne Castle.
	Nonferrous Group B: Departure for Stresa on Lake Maggiore.

June 22

8:30 a.m.	Group A:	Departure for Ostia.
9:30		Visit to Cogne. Ladies will go on excursion to Courmayeur.
9:30	Group B:	Visit to Institute of Light Metals in Novara.
1:00 p.m.	Group A:	Lunch offered by Cogne, by personal invitation.
	Group B:	Lunch offered by Montecantini, by personal invitation.
3:00		Departure of both groups for Genoa.

June 23

9:30 a.m.	Visit to Cornigliano. Ladies will tour town.
1:00 p.m.	Lunch offered by Finsider, by personal invitation.
3:00	End of program.

Additional cost of this tour is not yet known. If interested, please notify: W. H. Eisenman, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

First Meeting in Quebec Features Stainless Steel

Speaker: J. Ogilvie

Shawinigan Chemicals Ltd.

The first technical meeting of the recently formed **Quebec Chapter** was held in January and was attended by 36 members and friends.

After the showing of a film, loaned by courtesy of the A. V. Roe Co., which described the design and production of the "Orenda" jet engine and the CF-100 all-weather fighter, a lecture on "Stainless Steel" was given by J. Ogilvie, development metallurgist of Shawinigan Chemicals Ltd.

Dr. Ogilvie discussed briefly the early history of stainless steels, starting with the first observations of Faraday on the characteristics of chromium-bearing steel specimens, and leading up to the period of really active development of the last 30 years. He gave an excellent review of the available classes and types of stainless steel, describing the fundamental basis for their corrosion resistant qualities and explaining, for example, the reason for the "weld decay" phenomenon. The lecture was followed by a short but interesting discussion.—**Reported by J. E. Chard for Quebec.**

Ⓐ publishes the monthly *Metals Review*, containing a news report of the chapters' activities, combined with the Review of Metal Literature, prepared by the Battelle Memorial Institute. This is an annotated report on over 10,000 articles dealing with metals, gleaned from over 800 domestic and foreign publications.

IMPORTANT MEETINGS

for April

Apr. 13-15—American Society for Lubrication Engineers. 10th Annual Meeting, Hotel Sherman, Chicago. (E. Randolph, A.S.L.E., 84 E. Randolph St., Chicago 1, Ill.)

Apr. 22-23—Institute of Metals Division, American Institute of Mining and Metallurgical Engineers. New England Regional Conference, Hotel Statler, Boston. (Ernest Kirkendall, Secretary, Metals Division, A.I.M.E., 29 W. 39th St., New York 18, N. Y.)

Apr. 27-29—Society for Experimental Stress Analysis. Spring Meeting, Hotel Statler, Los Angeles. (W. M. Murray, Secretary, - Treasurer S.E.S.A., Central Square Station, Cambridge 39, Mass.)

Casting Practices Brought Up-to-Date At Columbus Meeting

Speaker: S. C. Massari
Hansell-Elcock Co.

At a joint meeting of the **Columbus Chapter** and the local section of the American Foundrymen's Society, S. C. Massari, manager, foundry division, Hansell-Elcock Co., spoke on "Recent Developments in Casting Practice".

The speaker first discussed the consideration of the use of castings. He pointed out that a casting must give the desired service performance at a minimum over-all cost. The importance of gray iron among cast metals was illustrated by the 1953 production figures. On a tonnage basis, gray iron had a 10:1 advantage over cast steel, which reflects the fact that gray iron is cheaper than cast steel.

In discussing fundamentals of casting practice, the speaker recommended that the design engineer consult frequently with the foundryman. Ways in which the foundryman can help improve performance and reduce costs include: (1) Designing the casting; (2) eliminating costly cores and chills; (3) minimizing internal stresses; (4) achieving maximum castability; (5) selecting the best type of patterns; and (6) determining the kind of metal which should be used. The foundryman can help the design engineer strength-wise, design-wise and dollar-wise.

In discussing the fact that gray iron is section sensitive, Mr. Massari gave illustrations of castings in which the size of certain sections was reduced and at the same time the castings were made stronger. Since these redesigned castings were lighter, they were also cheaper.

Castings have essentially an equiaxed structure, and, for that reason, possess "equi-axed" properties. This is in contrast to the directional properties of wrought steel. A centrifugally cast gun liner is an excellent example of the advantage of equiaxed cast metal in certain applications. A wrought tube has its poorest properties in the direction for resisting bursting.

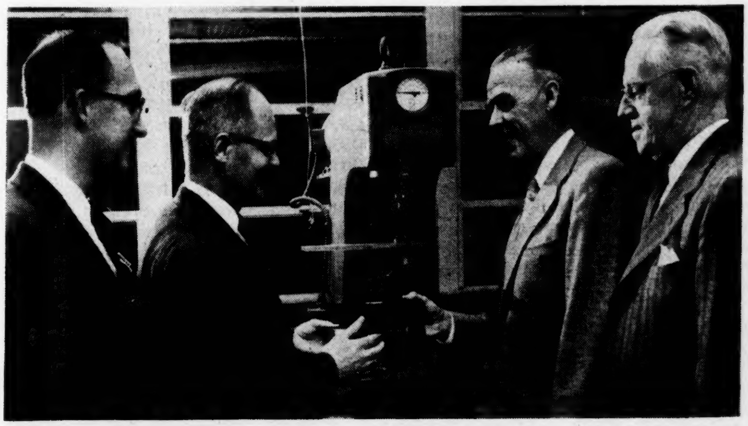
Among the recent trends in foundry practice discussed were closer control of all raw materials and processes, better finish, closer dimensional tolerances and recognition of the need for a sound cost system. Two ways were suggested for reducing costs: Getting your own house in order, and doing a good job of buying. The speaker illustrated the second method by describing a number of changes in purchasing, storage and materials handling instituted at his own plant. Buying core oil in 6000-gal. carload lots not only gives the purchaser a bargaining advantage but also saves the costs of drums and their disposal, thus greatly reducing handling costs. A $2700 underground storage tank paid for itself in seven months. A $21,000 unloader is expected to pay for itself in a year and eight months by saving in two ways. It replaces three of the four men formerly needed to unload sand and coke, and in addition, former methods for unloading produced 25% undesirable coke breeze, while use of the unloader results in only 5%.

Among the new casting techniques the speaker discussed were: High-pressure diaphragm molding; shell molding; use of new oils which permit cores to be baked in a few minutes; improved gating practice which has resulted from A.F.S.-sponsored research with transparent plastic models, water and high-speed photography; use of the basic cupola; changes in tuyere design which permit deeper penetration of the blast into the charge; and the production of nodular iron.—**Reported by Ellis Fletcher for Columbus Chapter.**

Discusses Fracture Analyzing Methods

Paul Ogden, Phillips Petroleum Co. (Left), S. W. Poole, Republic Steel Corp. (Center), and George Sykora (Right) Chairman of the Tulsa Chapter, Are Shown as They Discuss Mr. Poole's Lecture on "Methods for Analyzing Fractures" During a Recent Meeting. (Reported by Robert E. Miller)

Present Brinell Tester to High School



Officers of the Worcester Chapter Presented a Brinell Hardness Testing Machine to the Worcester Boys Trade High School. Pictured at the presentation ceremony are, from left: Joseph C. Danec, Chapter chairman; Rudolph A. Johnson, educational committee chairman; John A. Carty, head of the machine department at the school, and Walter B. Dennen, director of the school. The machine was purchased by the Worcester Chapter with funds used in previous years to present technical symposiums and will be used in the machining, drafting and welding departments of the school. (Reported by C. Weston Russell for Worcester)

Traces Development of Powder Metallurgy

Shown During a Meeting Held Recently by the Oak Ridge Chapter Are, From Left: Gregory J. Comstock, Director, Powder Metallurgy Laboratory, Stevens Institute of Technology, and Robert Crouse, Technical Chairman of the Meeting. Professor Comstock presented an interesting discussion of the "History of Powder Metallurgy and New Developments"

Speaker: Gregory J. Comstock
Stevens Institute of Technology

The **Oak Ridge Chapter** heard Gregory J. Comstock, director, powder metallurgy laboratory, Stevens Institute of Technology, present a talk on the "History of Powder Metallurgy and New Developments" at a recent meeting.

The first commercial product was ductile tungsten wire for electric lights, developed in 1912 by Langmuir, Coolidge and Fink. Their results were so encouraging that the Cleveland Lamp Works was built and here, Zay Jeffries and Benjamin Benbow, a man whose importance is rarely recognized, developed many of the present techniques used in powder metallurgy.

The second commercially important powder metallurgy product was the hard cemented carbide dies. The Germans were pioneers in this field, and the Carboloy Co. and Firth-Sterling were the first producers of hard carbide cemented tools in America after World War I. The first users were Ford and General Electric.

Next, Gilson of General Electric developed the porous bearing and the oil impregnated bearing which led to the first sealed motors for refrigeration units. Other developments since that time have been oil pump gears which cut machining time by 90%; door locks for automobiles which have strength, self-lubrication, and yet are not "grease sinks"; and welding electrodes. Such was the status of powder metallurgy in 1939. Many applications were found and numerous primary powders existed for these uses, but there was one conspicuous absence . . . no alloy powders existed then.

Professor Comstock described the technique he developed in 1939 for producing alloy powders. Each particle has the proper alloy composition, which is done by the disintegration of a thin stream of the melted alloy by jets of water. The water jet rapidly quenches the tiny particles formed and thus prevents high-temperature oxidation. Many new applications of these alloy powders are certain to develop.

During World War II the Germans used iron powder rotating bands on shells to increase gun life by as much as 50%, and also developed a hard cemented carbide for use in projectiles which could penetrate armor 10½ in. thick.

Hot coining, a recent development, is a process in which the powder product is pressed to 80 to 90% of the final density at room temperature and then hot pressed to the final structure with an accompanying degassing step. After the war, Duwez at California suggested the liquid cooling of powder products; by the use of spherical particles, controlled porosity for sweat cooling is produced. This process is now being applied in the jet aircraft industry.

Professor Comstock also discussed the cheap and efficient RZ process for commercially producing iron powder. He showed two very interesting and basic films on powder metallurgy. The first covered some of the applications of powder metallurgy and the second reviewed the production steps in making bearings, mixing, pressing and sintering. **—Reported by David L. McElroy for the Oak Ridge Chapter.**

Explains Advances in Surface Finish Control Processes at New Haven

Speaker: E. M. Hensley
Brush Electronics Co.

E. M. Hensley of Brush Electronics Co., spoke on "Recent Developments in Surface Finish Control" at a meeting of the **New Haven Chapter.** In the past years there has been an amazing amount of development in the automobile engine, the airplane and other machinery, which has resulted in higher loadings and increased speeds of moving parts. In order to withstand these more severe operating conditions with minimum friction and wear, a particular surface finish is often essential.

E. M. Hensley

The importance of accurately measuring surface roughness and of setting up an organized national system of designation of the degree of roughness as well as the character and the method used in producing a particular type of finish were noted by the speaker. The importance of these measures can readily be observed in the tendency toward decentralization of industry, where parts of a complete assembly may be made in many different sections of the country, and possibly assembled in still another place.

Proposed A.S.A. standards were discussed at some length. Mr. Hensley pointed out the importance of the type of instrument to use, the type of calibration and, specifically, the wave length cutoff, the length of memory of the system and the method of calculating the degree of roughness from a profile.

He also discussed the classification of surface characteristics, designation of surface characteristics, stylus-type instruments, precision reference specimens and roughness comparison specimens.**—Reported by F. E. Storm for New Haven.**

Schedule Engineers' Day

Colorado School of Mines has announced that its 21st annual Engineers' Day will be held Apr. 15-16 at the school. Main speaker on the program will be Gustav Egloff, director of research for Universal Oil Products Co. Events include technical sessions conducted by experts in the mineral industries, scholarship awards to outstanding Colorado high school seniors, prizes for technical papers by Mines students, rock drill and mucking contests, and guided tours of the campus and the college's experimental mine.

Cites Roll of Metallurgy In Atomic Energy at Ottawa Valley Meeting

Speaker: Maurice J. Lavigne

Department of Mines & Technical Surveys

"Role of Metallurgy in Atomic Energy" was the subject of a talk given by Maurice J. Lavigne, nuclear metallurgy section, Mines Branch, Department of Mines & Technical Surveys, Canada, before the **Ottawa Valley Chapter.**

Dr. Lavigne discussed the metallurgical problems associated with the design and operation of a nuclear reactor. A low neutron capture characteristic is of prime consideration in the choice of reactor materials other than fuel elements. Corrosion resistance, physical and mechanical properties and ease of fabrication are other considerations dictating the final choice of material for a particular pile application.

Uranium fuel elements have poor corrosion resistance, at even moderate temperatures, to liquid and gaseous coolants. Hence they must be protected by a sheath of metal with low neutron capture cross section. Aluminum, magnesium, beryllium and zirconium are materials of suitable nuclear properties.

Dr. Lavigne outlined a number of interesting and troublesome complications that arise because of the build-up of fission products within the fuel during service in a reactor which are important considerations in the economic operations of reactors.—**Reported by G. B. Craig for Ottawa Valley.**

Electropolishing Advantages Given Before Saginaw Valley

Speaker: Charles L. Faust

Battelle Memorial Institute

At a meeting of the **Saginaw Valley Chapter** during which 25-year members were guests of honor, Charles L. Faust, chief of electrochemical engineering division, Battelle Memorial Institute, presented a talk on the "Practical Aspects of Electropolishing".

Dr. Faust compared the nature of a metal surface produced by electropolishing to that produced by tool or abrasive cutting and polishing, and showed the effects that surface conditions have on the appearance and protection of electroplates, properties, fatigue strength and inspection of metal.

A movie, "Fighting Fires in Oil Storage Tanks" was shown. It pictured the installing of air lines to the bottom of tanks which could be used to agitate the oil and thus aid in bringing fires under control.—**Reported bv A. S. Dryden for Saginaw Valley Chapter.**

Organic Finishing Topic at Rochester

Shown Examining a Paint Drying Test Sample During a Recent Meeting Held by the Rochester Chapter Are, From Left: S. Gamlen, Chapter Reporter; C. Hendershott, Bausch & Lomb Optical Co., Who Gave a Talk on "Organic Finishing of Metals"; and Leon C. Kimpal, Vice-Chairman of the Chapter

Speaker: Charles Hendershott

Bausch & Lomb Optical Co.

Charles Hendershott, superintendent of factory engineering and inspection, Scientific Instrument Division, Bausch & Lomb Optical Co., presented a discussion on the "Organic Finishing of Metals" at a meeting held in **Rochester.**

Mr. Hendershott's subject applied mainly to the decorative finishes field and consisted of the following broad topics: Establishing a paint specification; testing program as applied to purchased specification coatings; and the preparation of surfaces.

The specification for an organic finish is often difficult to determine because, in many cases, information is lacking concerning its use. All factors, including decorative effects, drying time and hiding power, must be given consideration. It may be found that the requirements of the coating render it impossible to formulate or unduly costly, in which cases, compromises must be made.

Once a specification has been arrived at that can be supplied by paint manufacturers, it is advisable to check a small sample by conventional tests, depending on the requirements, such as taber abrasion, salt spray or bend and scratch tests, before and after weathering or immersion tests. Next a pilot run, requiring the purchase of a small quantity of the specification finish, on production parts is advisable as a further check on the vendor's product and a test of the production application. The latter test may disclose difficulties which will necessitate adjustment of the specification. Routine checks of future lots is recommended.

Surfaces must be properly cleaned before applying the coating. Primers will assist in obtaining good results with finish coats. If primers are used, then nearly as many primers as base materials used will normally be required. Mr. Hendershott has found that by using certain conversion coatings, the number of primers required may be materially reduced. Certain amorphous types of phosphate conversion coatings will permit forming after coating, whereas the crystalline types will spall off. Magnesium especially requires a conversion type of treatment prior to finish coating.

Mr. Hendershott cited examples where cooperation and understanding between the metal finisher and metallurgist has helped solve metal finishing problems.—**Reported by Sydney Gamlen for Rochester.**

Ceramets Topic at Syracuse

Speaker: T. F. Frangos

Haynes Stellite Co.

"Cerамets", a talk delivered by T. F. Frangos, sales engineer, Haynes Stellite Co., before the **Syracuse Chapter,** included a discussion of the processing and types of parts made, as well as several uses of such materials. The speaker pointed out that the application of ceramets will steadily increase because of their high-temperature resistance properties.—**Reported by L. L. McArthur for Syracuse Chapter.**

Materials Problem in Nuclear Reactors Subject At Meeting in Fort Wayne

Speaker: Frank G. Foote
Argonne National Laboratory

Frank G. Foote, director, metallurgy division, Argonne National Laboratory, gave a talk on "Materials Problems in Nuclear Reactors," at a meeting in **Fort Wayne.**

Dr. Foote pointed out that the nuclear energy industry has definite materials that they can use. These materials must meet specific requirements and peculiar specifications; density of a material is a greater factor than tensile strength when used for nuclear reactor construction.

Dr. Foote discussed the difficulty of selecting materials for reactors, stating, for example, that the thermal neutron absorption cross section of each material must be examined for specific use. Uranium from ores contains only 0.7% useful U^{235} for chain reaction. Therefore the uranium must be refined chemically to secure a concentrated material with a high purity content since small amounts of high absorption cross section impurities effects the fission reaction.

Dr. Foote introduced the cross section (absorption) unit as being a "barn" which is equivalent to 1×10^{-24} sq. cm. and a "shed" as 1/1000 of a "barn". Values in barns of some of the low neutron absorption cross section elements are: oxygen, 0.0016; carbon, 0.0045; beryllium, 0.009; bismuth, 0.015; magnesium, 0.07; zirconium, 0.18; aluminum, 0.22; and tin, 0.600. Some of the high absorption cross section elements are: cadmium, 3000, and boron, 715. Most of the common structural materials, such as iron and copper, have too great an absorption cross section to permit their use in any great quantity in reactors.

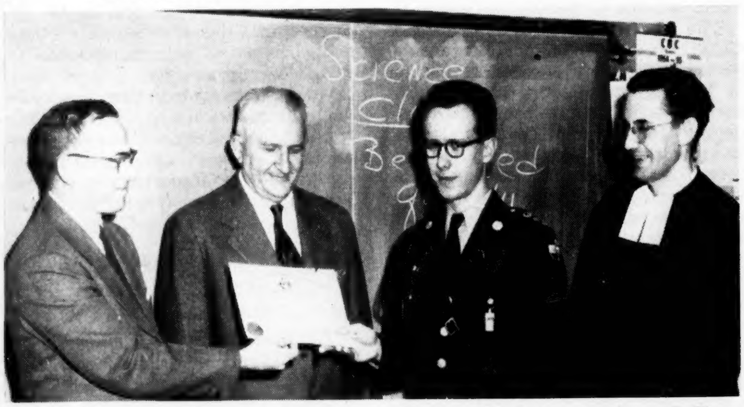
Dr. Foote explained that after starting a reactor it must be controlled. He explained one way of controlling a reactor by using a high absorption cross section material. When zirconium is used as a structural material, the refinement of the ore yields approximately 1 to 2% hafnium, which has a rather high absorption cross section and can be used as a control material. The fission of the U^{235} develops a thermal reaction which must be controlled by cooling. As uranium is not a good heat conductor, a considerable amount of effective coolant is necessary. This coolant must not be corrosive to the highly reactive uranium. Heavy water, helium gas and liquid metals are some of the coolants that have been used.

Dr. Foote explained that shielding of radioactivity is necessary for existing life and the use of vital instruments. He mentioned that shielding is a factor of weight and therefore a heavy material, such as lead or large volumes of concrete to create this mass, are generally used in shielding out beta and gamma rays. **—Reported by Lee Van Fossen for Fort Wayne Chapter.**

Past Chairmen Hear Roberts in Texas

National President George A. Roberts Gave a Talk on "Toolsteels" at the National Officers—Past Chairmen's Night Meeting of the Texas Chapter. Shown are, seated, from left: W. Mack Crook, Charles H. Shapiro, R. W. Schlumpf, first Texas chairman; W. E. Burndrett, Wade W. Hampton and Carl S. Cook. Back row, from left, are: Milton W. Phair, A. R. Oakley, Jr., present chairman, K. P. Campbell, Dr. Roberts, Harold W. Schmid, F. M. Wittlinger and Glen R. Ingels. Missing are past-chairmen R. M. Garrison, W. A. Kuenemann, H. C. Dill, and George G. Harrington, who died in December 1954. (Reported by Bob Blake; photograph by Lee Dolan)

Student Receives Science Award



Robert Kurz, President of the Science Club at Christian Brothers College, St. Louis, Is Shown During the Presentation of a Third-Place Award for His Entry on "Study of a PH Meter" in the A.S.M.-Sponsored Future Scientists of America Program. Norman Jones (second from left), head of the St. Louis Science Fair, and Brother Charles, look on. George A. Fisher, Jr. (left) chairman of the St. Louis Chapter, made the presentation

Tells How To Design For Cemented Carbides

Speaker: W. L. Kennicott
Kennametal, Inc.

W. L. Kennicott, chief engineer, Kennametal, Inc., gave a lecture entitled "Designing for Cemented Carbides" at the sustaining members night meeting held by the **Carolinas Chapter.** Mr. Kennicott accompanied his lecture with slides and actual carbide tools of various sizes and applications.

Harold X. "Curley" Summers, member of the National Labor Relations Board, the coffee speaker, presented a talk on the "Work of the Labor Board", in which he gave examples of diplomacy with words.

New sustaining members of the Chapter were presented with certificates.—**Reported by H. Richard Tillman for Carolinas Chapter.**

A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad Received During the Past Month

Prepared by the Technical Information Division of Battelle Memorial Institute, Columbus, Ohio

A General Metallurgical

27-A. Metals in 1954. A. A. Watts and G. K. Manning. *Chemical and Engineering News,* v. 33, Jan. 10, 1955, p. 119-122.

Post-Korea slump cushioned by expanding construction and government support. Technical progress. (A4)

28-A. Foundry College Sponsored in England. (Digest of "The National Foundry College"; *Metallurgia,* v. 49, Mar. 1954, p. 141.) *Metal Progress,* v. 67, Jan. 1955, p. 198, 200.

Facilities and aims of the college. (A3, E general)

29-A. The British Non-Ferrous Metals Research Association. B. Fullman and E. C. Mantle. *Metal Progress,* v. 67, Jan. 1955, p. 93-97.

Typical of some 40 British research associations supported by industry with some government assistance is the Non-Ferrous Association with more than 600 member firms. In addition to the principal job of conducting fundamental and applied research, it provides a consulting service for solving specific problems and an information service, all free of charge to members. Photographs. (A9)

30-A. Contemporary Metal Processing Techniques in Russia. N. H. Polakowski. *Metal Progress,* v. 67, Jan. 1955, p. 98-103.

The only knowledge we have of Russian technology is that which Russia wants us to have. In spite of this severe censorship and regulation of the technical reports and periodicals, enough information leaks through the Iron Curtain to give a few clues of the progress being made in a number of its divisions in metalworking. More interesting perhaps than these rather obvious conclusions are the inferences instilled by the studious omission of news from countless branches of metallurgical endeavor. Diagrams. (A general)

31-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging,* v. 21, Dec. 1954, p. 563-568.

Defines "oriental emerald" to "oxidizing agent". Tables, diagrams, graphs. (A10)

32-A. Automatic Safety System for Hydrogen Lines. (Digest of "Safety Installation for Hydrogen Distribution Lines"; *National Bureau of Standards' Technical News Bulletin,* 1954, Oct., p. 149.) *Metal Progress,* v. 67, Jan. 1955, p. 214.

Valve system permitting automatic flooding of the system with helium in case of interruption of hydrogen flow. Diagram. (A7)

33-A. (Book.) **International Symposium on the Reactivity of Solids, Gothenburg 1952, Proceedings.** 1102 p. 1954. Ingeniörsvetenskapsakademien and Chalmers Tekniska Högskola, Gothenburg, Sweden. $12.81.

Contains 109 papers in either English, French, or German covering theory, mineral reactions, measuring methods, catalysts, cement, ceramics, refractories, glass, metallurgy, and powder metallurgy. Metallurgical papers are individually abstracted. (A general)

34-A. (Book—German.) **Electric Heating Congress Paris and Essen.** 138 p. 1954. Vulkan-Verlag Dr. W. Classen, Haus der Technik, Hollestrasse 1 g, Essen, Germany.

Collection of papers on electric heating in the metallurgical industry covering: production, refining, and processing of pig iron and steel; production and processing of nonferrous metals; vacuum melting and sintering; production and processing of non-metallic materials; heat and power production; construction of furnaces; and measuring technology. (A general)

B Raw Materials and Ore Preparation

36-B. Blast Furnace Coke. *Industrial Heating,* v. 21, Dec. 1954, p. 2463-2464, 2466, 2468.

Preparation of metallurgical grade; hot water quenching; pressure-test oven. (B18, D1, B21)

37-B. Impurities in Metals. H. W. Greenwood. *Metal Treatment and Drop Forging,* v. 21, Dec. 1954, p. 571-573.

Role of some impurities in providing desired electrical, magnetic, machining and hardening characteristics in various metals. (B22, P15, P16, G17, J26)

The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

38-B. (German.) **Chemical and Physical Processes in the Direct-Process Revolving Tubular Furnace.** Horst Weidermann. *Metallurgie und Giessereitechnik,* v. 4, no. 11, Nov. 1954, p. 462-468.

Processes in the preheating and reduction zones during sintering of iron ore. Diagrams, graphs, photographs. 4 ref. (B16, Fe)

39-B. History of Iron Ore Sintering Recalls Variety of Experimentation. Michael O. Halowaty. *Journal of Metals,* v 7, Jan. 1955, p. 19-23.

Review of sintering, briquetting, blocking and nodulizing experiments leading to modern sintering practice. Photograph, diagram, tables, graph. 22 ref. (B16)

40-B. Electrolytic Production of Hydrometallurgical Reagents for Processing Manganese Ores. J. Bruce Clemmer, Carl Rampacek and P. E. Churchward. *Journal of Metals,* v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 51-54.

A cyclic method for emergency use based on sodium sulfate additions and diaphragm cells. Tables, flow chart. 2 ref. (B14, Mn)

41-B. (Hungarian.) **Experiments for Accelerating the Settling of Red Mud in the Bayer Process.** Tihamér Gedeon. *Kohaszati Lapok,* v. 9, no. 8, Aug. 1954, p. 358-361.

Use of calcium carbonate or barium sulfate for establishing optimum roasting of bauxite; classifying the liquor after settling. Diagrams, tables. 4 ref. (B14, Al, Si, Fe, Ti)

42-B. (Hungarian.) **Dolomite Purification and Causticizing of Aluminate Liquors in the Alumina Plant.** Istvan Magyarosy and Antal Aradi. *Kohaszati Lapok,* v. 9, no. 8, Aug. 1954, p. 362-365.

Experimental data on substitution of dolomite for burnt lime; interpretation of results in industrial terms. Tables. (B14, Al, Mg)

43-B. (Hungarian.) **Control of the Stirring of Aluminate Liquors in the Alumina Plant by Physical Methods.** Béla Fogarasi. *Kohaszati Lapok,* v. 9, no. 8, Aug. 1954, p. 366-369.

Method for controlling changes during stirring by checking the specific gravity. Graphs, tables, nomogram. 3 ref. (B14, Al, Na)

44-B. (Russian.) **Some Basic Reactions of the Process of Oxidation of Sulfide Ores.** M. E. Pozin, A. M. Ginstling and V. V. Pechkovskii. *Zhurnal Prikladnoi Khimii,* v. 27, no. 12, Dec. 1954, p. 1237-1243.

Interaction of various sulfates with sulfides of lead, zinc or cadmium. Tables, graphs. 16 ref. (B14, Zn, Cd, Pb)

45-B. Australian Zinc and Cadmium Industry. R. Mallikarjunan. *Central Electrochemical Research Institute, Karaikudi, Bulletin,* v. 1, Oct. 1955, p. 22-26.

Preparation of ores and refining of the metals. Tables, flowsheet. (B general, C general, Zn, Cd)

46-B. (English.) **The Calcium Oxide Wüstite System.** Vittorio Cirilli and Aurelio Burdese. Paper from "International Symposium on the Reactivity of Solids, Gothenburg 1952, Proceedings". Ingeniörsvetenskapsakademien and Chalmers Tekniska Högskola. p. 867-878; disc., p. 879.

Studies of equilibria which exist in openhearth slags. Tables, graphs, micrograph. 15 ref. (B21, D2)

47-B. (German.) **The Electrical Conductivity of Slags in the Solid and the Molten State.** Hans Hofmann and Borut Marincek. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 11-12, Nov.-Dec. 1954, p. 523-526.

Equilibrium reactions between metal and slag phase. Diagram, table, graphs. 10 ref. (B21, P15)

48-B. (Polish.) **Obtaining Cobalt As a By-Product During the Hydrometallurgical Treatment of Lean Polymetallic Ores.** J. Kamecki and J. Sedzimir. *Hutnik,* v. 21, no. 10, Oct. 1954, p. 321-324.

Methods of cobalt recovery from copper pyrite ores. 12 ref. (B14, C21, Co, Cu)

C

Nonferrous Extraction and Refining

23-C. The Role of the Electric Arc Furnace in Utilizing Some Strategic Off-Grade Ores. Lloyd H. Banning. *Electrochemical Society, Journal,* v. 101, Dec. 1954, p. 613-621.

Use of a dry-top, arc-resistance, electric smelting technique, and smelting test data. Relationship between theoretical smelting efficiency and slag-to-metal ratio. Tables, graphs. 10 ref.

(C21, Ni, Mn, Fe, Cr, Al, Si)

24-C. (Czech.) **Preparation of Zirconium and Zirconium Hydride for Vacuum Refining.** Frantisek Plzak. *Hutnické Listy,* v. 9, no. 11, Nov. 1954, p. 650-655.

Equipment and processes for producing zirconium from zircon. Diagrams, photographs, micrographs. 10 ref. (C25, Zr)

25-C. (Polish.) **Flux Method of Refining Copper Alloys.** K. Rutkowski. *Prace Instytutu Odlewnictwa,* v. 3, no. 2, 1953, p. 68-75.

Effects of flux and fluxing methods on mechanical properties of copper and copper alloy castings. Tables, micrographs, graphs. (C21, Q general, Cu)

26-C. Progress in European Vacuum Melting Described. H. H. Scholefield. *Journal of Metals,* v. 7, Jan. 1955, p. 25-27.

Improvements in pumping equipment and furnace design. Photograph, graphs, diagram. 5 ref. (C25)

27-C. Electric Furnace Melting Practice. Warren A. Sheaffer. *Journal of Metals,* v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 33-38.

Equipment and practices for producing tough-pitch copper. Diagrams, photographs, graph, tables. 2 ref. (C21, Cu)

28-C. (Hungarian.) **The Current Efficiency in Aluminum Electrolysis. II.** Gyula Szekér. *Kohaszati Lapok,* v. 9, no. 6, June 1954, p. 256-261.

Effect of V_2O_5, P_2O_5, Fe_2O_3, TiO_2 and SiO_2 on current consumption. Tables, graphs. 14 ref. (C23, Al)

29-C. (Hungarian.) **Manufacturing Experience of Production of Vanadium, With Respect to the Problems of Producing High-Purity V_2O_5.** Endre Bogardi. *Kohaszati Lapok,* v. 9, no. 6, June 1954, p. 261-266.

Plant operations and manufacturing technology; conditions for large-scale production; possibilities for processing strongly contaminated vanadium muds. Tables, photographs. (C general, V)

30-C. (Hungarian.) **Influence of Various Factors on the Life Span of Aluminum-Electrolysis Vats.** A. I. Bjeljajev. *Kohaszati Lapok,* v. 9, no. 6, June 1954, p. 274-278.

Effect of quality of carbon-briquette lining, design of vat, quality of electrical connections, method and duration of heating-up of vat, peculiarities of starting vat, operation after starting and working conditions during operation. Diagram. (C23, Al)

31-C. Preparation of Actinium Metal. Joseph G. Stites, Jr., Murrell L. Salutsky and Bob D. Stone. *American Chemical Society, Journal,* v. 77, Jan. 5, 1955, p. 237-240.

Radioactive metal prepared by lithium reduction of actinium fluoride. Tables. 18 ref. (C26, Ac)

32-C. This is Magnesium. L. M. Pidgeon. *Canadian Metals,* v. 18, Jan. 1955, p. 20, 22, 24-25.

Pidgeon process and its application in Canada. Uses and properties of magnesium. (C26, T general, Mg)

33-C. Preparation of Tri- and Tetra-Chlorides of Titanium. N. N. S. Siddhanta, K. R. Shenoy and B. B. Dey. *Central Electrochemical Research Institute, Karaikudi, Bulletin,* v. 1, Oct. 1955, p. 30-32.

Laboratory method capable of producing 2 to 3 g. per hr. of anhydrous trichloride. Diagram. 14 ref. (C23, Ti)

34-C. Purification of Gallium by Zone-Refining. D. P. Detwiler and W. M. Fox. *Journal of Metals,* v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 205.

Combination of acid leaching and zone refining used to produce high-purity specimens. Table, photograph. 6 ref. (C5, Ga)

35-C. (French.) **Desulfurization of Tin Bronzes by Sodium or Magnesium.** Marcel Cirou and Pierre-Julien Le Thomas. *Fonderie,* 1954, no. 107, Dec., p. 4281-4284.

Evaluation of processes. Tables. (C26, Mg, Sn, Cu, Na)

D

Ferrous Reduction and Refining

59-D. A Survey of the Results of the Examination of the Brickwork of Blown-Out Blast-Furnaces. H. M. Richardson and G. R. Rigby. *Iron and Steel Institute Special Report no.* 51, Oct. 1954, 35 p.

Data for 79 furnaces at 30 plants examined during the last 20 yr. (D1)

60-D. Pig Iron Made From Low-Grade Fine Ore and Noncoking Coal. *Metal Progress,* v. 67, Jan. 1955, p. 81-86.

Construction and operating experience of semicommercial low-shaft blast furnace. Diagrams, photographs. (D1, Fe)

61-D. French Steelmaking Progress in 1954. G. Husson. *Metal Progress,* v. 67, Jan. 1955, p. 127-128, 202, 204.

Optical pyrometers are being attached to converters, and the blast (air plus oxygen and steam) regulated so melt is cool until just before the end of the blow. Openhearth research in France is centered on gas movements, combustion and control of sulphur from high-sulphur fuel oil. (D3, D2, ST)

62-D. (German.) **Correlation Between Furnace Design and Wear of the Refractory Lining in the Blast Furnace.** Heinrich Kahlhöfer and Alfred Send. *Stahl und Eisen,* v. 74, no. 26, Dec. 16, 1954, p. 1697-1713.

Review of developments, prevention of salamander formation, use of carbon brick. Diagrams, photographs, graphs. 32 ref. (D1)

63-D. (Hungarian.) **Economical Utilization of Steel Scrap Containing Chromium by Oxygen Blast.** Erno Weigl. *Kohaszati Lapok,* v. 9, no. 11, Nov. 1954, p. 490-492.

Hungarian investigations on three experimental charges with varying oxygen concentrations in the blast. Graphs. (D3, ST)

64-D. Electrostatic Precipitation of Open Hearth Furnace Dust. J. H. Smith. *Blast Furnace and Steel Plant,* v. 43, Jan. 1955, p. 58-59.

Experience with gases from large hot-metal charged furnaces. Photographs. (D2, A6)

65-D. Development in German Blast Furnace Design and Practice. David Knall. *Blast Furnace and Steel Plant,* v. 43, Jan. 1955, p. 83-84, 96, 98.

Contrast of old and new designs on recently installed equipment. Diagrams, table. (D1)

66-D. Sulphur Removal Studies in Basic Electric Furnace Melting. Edward A. Loria. *Blast Furnace and Steel Plant,* v. 43, Jan. 1955, p. 86-87, 114-115.

Slag compositions and properties for best performance. Graphs, table. 7 ref. (D5, ST)

67-D. Hot Blast Cupola. R. Sewell. *Iron & Steel,* v. 28, Jan. 1955, p. 31-32.

Economics of a premelting unit in an openhearth shop. Tables, graph. 4 ref. (D2, ST)

68-D. Hydro-Arc Control Reduces Costs in Electric Furnace Operation. Joseph Seymour. *Journal of Metals,* v. 7, Jan. 1955, p. 17-18.

Controls, used with otherwise standard equipment, save power, refractories and time. Photographs, table. 1 ref. (D5)

69-D. Some Factors Affecting Open-Hearth Performance. D. J. Carney, J. J. Oravec and E. Van Meter. *Journal of Metals,* v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 39-50.

Factors influencing combustion-air temperatures and effects on operation of regenerative systems. Diagrams, photograph, tables, graphs. 2 ref. (D2)

70-D. Low Temperature Reduction of Iron Oxides. A. D. Franklin and R. B. Campbell. *Journal of Physical Chemistry,* v. 59, Jan. 1955, p. 65-67.

Reactions in the vicinity of 200° C. Tables, graph. 19 ref. (D general, Fe)

71-D. (Hungarian.) **The Influence of Method of Obtaining and Preparing Specimens on High-Quality Steel Making.** Laszlo Stehlik. *Kohaszati Lapok,* v. 9, no. 6, June 1954, p. 247-252.

Sources of error in obtaining and processing test specimens. Practical eaxmples. Tables, photographs. (D general, S12, CN)

72-D. (Hungarian.) **Some Problems of Modern Steel Production.** Ernö Weigl. *Kohaszati Lapok,* v. 9, no. 8, Aug. 1954, p. 346-348.

Importance and effect of manganese; rate of carbon reduction; desulfurization; production of refractory brick. Graphs. (D general, ST, Mn)

73-D. The Basic Open Hearth Process. III. G. Reginald Bashforth. *British Steelmaker,* v. 21, Jan. 1955, p. 10-17.

Melt and slag control in hot and cold metal operation; features of modern basic practice. Graph, tables, photograph. 20 ref. (D2)

74-D. (English.) **Desulphurization of Molten Pig Iron With Pulverized Lime.** Bo Kalling. Paper from "International Symposium on the Reactivity of Solids, Gothenburg 1952, Proceedings". Ingeniörsvetenskapsakademien and Chalmers Tekniska Högskola. p. 913-920.

Process does not melt the lime but results in rapid and effective removal of sulfur. Diagrams, tables, graphs. (D1, CI)

75-D. (Czech.) **Diffusion Deoxidation With Coke in the Open-Hearth Furnace.** Alex Dekanovsky. *Hutnické Listy,* v. 9, no. 12, Dec. 1954, p. 727-731.

Results of studies on various deoxidation practices. Tables. 1 ref. (D2, CN)

76-D. (German.) **Slagging of Titanium From Steel Melts in the Acid and Basic High-Frequency Furnace Under Different Slags.** Peter Bardenheuer and Wilhelm Anton Fischer. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 11-12, Nov.-Dec. 1954, p. 515-521.

Behavior of titanium-containing steel melts; reduction of silica by titanium; recommends lime-corundum slag for melting titanium steels. Graphs, table, refractograms, micrographs. 10 ref. (D6, AY)

E

Foundry

81-E. Measurement of the Moisture Content of Sand. R. G. Godding. *British Cast Iron Research Association. Journal of Research and Development,* v. 5, Dec. 1954, p. 473-480 + 2 plates.

Apparatus and its limitations. Diagram, tables, photographs, graphs. 1 ref. (E18)

82-E. Shell Moulding Materials: Their Testing and Properties. D. A. Taylor. *British Cast Iron Research Association. Journal of Research and Development,* v. 5, Dec. 1954, p. 502-516 + 4 plates.

Test equipment can show effects of curing temperature, time, resin and clay content and properties of molding sands. Diagrams, photographs, tables, graphs, micrographs. (E16)

83-E. The Shell Moulding Process. W. A. Campbell. *Engineering Journal,* v. 37, Dec. 1954, p. 1610-1612.

Mechanics and advantages of the process. Photographs. (E16)

84-E. Mathematically-Designed Runner System to Eliminate Turbulence in Casting Cavity. J. Aston. *Foundry Trade Journal,* v. 97, Dec. 30, 1954, p. 769-770.

Effects of size gradations in runners on rate of metal flow into the mold. Diagrams. (E19)

85-E. Practical Method of Calculation of Riser Sizes. B. Millington. *Foundry Trade Journal,* v. 97, Dec. 30, 1954, p. 770-773; disc., p. 773.

Assumptions necessary for satisfactory design. Diagrams. (E22)

86-E. Plaster Mold Process Gives Better Aluminum, Magnesium Castings. G. R. Gardner. *Iron Age,* v. 175, Jan. 13, 1955, p. 88-90.

Technique for producing thin-walled castings with smooth surfaces and good mechanical properties. Diagrams, photographs. (E16, Q general, Al, Mg)

87-E. (Czech.) **Use of Small Coke for Cupola of 1200 Mm. Diameter.** Bretislav Sochor and Svatopluk Jouza. *Slévarenstvi,* v. 2, no. 11, Nov. 1954, p. 323-327.

Optimum size found to be 1/10 to 1/15 of i.d. of cupola. Graphs, diagrams, tables. 16 ref. (E10)

88-E. (Czech.) **Casting of Cutting Tools.** Otakar Moravek. *Slévarenstvi,* v. 2, no. 11, Nov. 1954, p. 335-338.

Production techniques and advantages of cast milling cutters. Photographs. (E11, G17, CI)

89-E. (French.) **Study of the Flow of Metal in Molds. Practical Application of Scientific Principles. Results.** Charles Trencklé. *Fonderie,* 1954, no. 106, Nov., p. 4207-4226; disc., p. 4226-4228.

Machine or hand-molded flat pieces cast in green sand with ordinary cast iron. Graphs, diagrams, tables, micrographs. 12 ref. (E19, CI)

90-E. (French.) **A Large Dutch Foundry's Experience, After the War, With the Cement Sand Molding Method.** A. de Bruin. *Fonderie,* 1954, no. 106, Nov., p. 4229-4234.

Reorganization of shops and training of personnel in cement sand molding procedures. Photographs, diagrams, graph. (E19)

91-E. (French.) **The Precision Foundry.** W. H. Sulzer. *Métallurgie et la construction mécanique,* v. 86, no. 11, Nov. 1954, p. 823 + 7 pages.

Lost wax process, materials used in precision foundry, construction principles, economic aspects. Photographs, diagrams, tables. (E15)

92-E. (German.) **The Deoxidation of Cast Iron Melts by Subsequent Treatment and Its Effect on the Structure.** Hans Schiffers. *Giesserei,* v. 41, no. 25, Dec. 9, 1954, p. 661-672.

Effect of ladle additions; crystallization of nodular graphite. Tables, graphs, micrographs. 38 ref. (E25, N12, CI)

93-E. (Polish.) **Casting Properties of Nodular Cast Iron.** Cz. Kalata, J. Piaskowski and Z. Falecki. *Prace Instytutu Odlewnictwa,* v. 3, no. 2, 1953, p. 49-54.

Fluidity is higher than for initial cast iron; it has tendency to form shrinkage holes. Diagrams, tables, micrographs, graph. 4 ref. (E25, CI)

94-E. (Polish.) **New Core Binders Based on Starch and Cellulose.** T. Rzepa. *Prace Instytutu Odlewnictwa,* v. 4, no. 4, 1954, p. 125-130.

Conditions and range of applications. Tables. (E21)

95-E. (Russian.) **Influence of Mold Temperature and Vacuum in it on Fluidity of Steel.** Iu. A. Nekhendzi and P. V. Sorokin. *Liteinoe Proizvodstvo,* 1954, no. 8, Nov., p. 17-20.

Experimental data and details of test equipment. Photograph, graphs, diagrams. 3 ref. (E25, CI)

96-E. (Russian.) **Seasonal Gas Porosity in Aluminum-Silicon Alloy Ingots.** A. A. Gorshkov and S. V. Vargin. *Liteinoe Proizvodstvo,* 1954, no. 8, Nov., p. 14-16.

Use of gaseous chlorine in the melt prevents absorption of hydrogen from air during periods of high humidity. Tables, graphs, micrograph. 12 ref. (E10, Al)

97-E. (Russian.) **Chlorine Treatment of Magnesium Alloys.** M. V. Sharov and B. S. Morozov. *Liteinoe Proizvodstvo,* 1954, no. 8, Nov., p. 20-22.

Effects of casting in chlorine, argon and helium atmospheres on porosity caused by absorption of hydrogen. Tables, graph. 2 ref. (E25, Mg)

98-E. Research Into the Use of Tannin-Base Corebinders. *Foundry Trade Journal,* v. 98, Jan. 6, 1955, p. 11-12.

Short stoving time permits high rates of core production. (E21)

99-E. Some Recent Developments in the Lost-Wax Casting Process. J. S. Turnbull. *Machinery (London),* v. 86, Jan. 7, 1955, p. 37-47.

Production of patterns; casting variations; economic considerations. Diagrams, photographs. (E15)

100-E. Magnesium Investment Castings Save Weight. John B. Campbell. *Materials & Methods,* v. 41, Jan. 1955, p. 94-95.

Advantage of high strength-weight ratio; economics of investment casting. Photographs. (E15, Mg)

101-E. (Czech.) **Dry Molding Mixtures With Quartz Sand.** Lev Petrzela. *Slévarenstvi, v. 2; Prace Ceskoslovenského Vyzkumu Slévarenského,* v. 1, no. 13, Dec. 1954, p. 89-100.

Evaluation of sand and clay mixtures for various casting conditions for steel and gray iron. Graphs, tables. 63 ref. (E18, CI)

102-E. (Dutch.) **Cement Sand as a Material for Foundry Molds. Points of Consideration on the Application of the Cement-Sand Molding Method.** H. G. Levelink. *Metalen,* v. 9, no. 24, Dec. 31, 1954, p. 395-398.

Properties of cores; advantages and disadvantages over other types of sand binders. 1 ref. (E18)

103-E. (German.) **Deoxidation of Cast Iron Melts by Subsequent Treatment and Its Effect on Structure.** Hans Schiffers. *Giesserei,* v. 41, no. 26, Dec. 23, 1954, p. 693-699.

Chemical and vacuum methods of deoxidizing; effect of deoxidizing and deoxidants on desulfurization and carbon content; mechanism of spherical graphite formation. Graphs, micrographs. 17 ref. (E25, N8, CI)

104-E. (Hungarian.) **Hungarian and Foreign Experiences in the Manufacture of Centrifugally Cast Cylinder Bushings.** Tibor Budinszky and Jozsef Gerédi. *Ontöde,* v. 5, no. 6, June 1954, p. 121-128.

Measures for securing a wear resistant surface structure; use of graphite instead of sand cores; elimination of defects. Photographs, diagrams. (E14, CI)

105-E. (Hungarian.) **Some Problems of Design in Machine Castings.** Jozsef Racz. *Ontöde,* v. 5, no. 8, Aug. 1954, p. 180-186.

Practical suggestions for meeting increased demands for quality include the reduction of hardness differences within the same piece and use of risers. Problems of core applications. Diagrams, tables. (E21, E22, CI)

106-E. (Polish.) **Synthetic Resins as Foundry Core Binders.** Ignacy Bursztyn, Jan Buciewicz and Tadeusz Rzepa. *Przeglad Odlewnictwa,* v. 4, no. 9, Sept. 1954, p. 241-251.

Tests on urea-formaldehyde compounds as substitutes for expensive natural fatty oils. Graphs. 16 ref. (E21)

107-E. (Polish.) **Example of the Use of the Fluidity Test in Determining the Causes of Defects in a Cast Iron Foundry.** Roman Krzeszewski and Jan Marcinkowski. *Przeglad Odlewnictwa,* v. 4, no. 11, Nov. 1954, p. 313-317.

Experience in lowering the number of rejects. Tables, photograph. (E25, CI)

108-E. **Salvaging Defective Light Alloy Castings.** W. M. Halliday. *Canadian Metals,* v. 18, Jan. 1955, p. 29-30, 31.

Avoidance and/or repair of typical defects. (E general, A8, Mg, Al)

109-E. **Precision Casting by the Lost-Wax Process.** J. S. Turnbull. *Engineering,* v. 179, Jan. 7, 1955, p. 22-24.

Includes investment process, solid-mold technique, centrifugal casting, vacuum casting and progressive solidification. Photographs. (E15, E14, E25)

110-E. **Improve Mold Feeding Systems to Cut Casting Scrap.** W. M. Halliday. *Iron Age,* v. 175, Jan. 27, 1955, p. 82-85.

Reduction of sand, slag and dross pick-up; control of temperature gradient and metal flow. Diagrams. (E23)

111-E. (Polish.) **Modified Malleable Cast Iron.** Waclaw Sakwa. *Wiadomosci Hutnicze,* v. 10, no. 12, Dec. 1954, p. 338-343.

Methods for reducing heating cycle; ferritic and pearlitic iron obtained from cupolas; heat treatment; structure and strength. Graphs, tables. 4 ref. (E25, E10, J general, Q23, CI)

F

Primary Mechanical Working

40-F. **Inert-Gas Forging.** Carl L. Kolbe. *Electrochemical Society, Journal,* v. 101, Dec. 1954, p. 601-603.

Equipment in which materials can be worked at very high temperatures without gross oxidation. For some alloys, less diffusion of gases, minor slippery oxide films, less surface cracking and easier deformation at higher temperatures. Diagrams, table. (F22, Mo, Ti W)

41-F. **Some Factors Affecting the Quality of Extrusions. III.** Christopher Smith and Norman Swindells. *Industrial Heating,* v. 21, Dec. 1954, p. 2446 + 6 pages.

Influence of temperature on extrusion of copper and aluminum alloys. Table. (To be continued.) (F24, Cu, Al)

42-F. **New Extrusion Techniques.** E. J. de Ridder. *Tool Engineer,* v. 34, Jan. 1955, p. 69-74.

Extrusions as forging stock; new dies for hollow extrusions; combined extrusion-forging operation; tapered designs; new straightening methods; thin wall extrusions. Diagrams, photographs. (F24, F22, Al, Mg)

43-F. **Soaps for Wire-Drawing.** H. F. Frost. *Wire Industry,* v. 21, Dec. 1954, p. 1199-1201, 1225.

Review of current practice and theory. Photographs. (F28, F1)

44-F. **The Influence of Lubricants on the Drawing Force in Cold-Drawing Wire Rod.** Werner Lueg and Karl-Heinz Treptow. *Wire Industry,* v. 21, Dec. 1954, p. 1211 + 4 pages. (Condensed from *Stahl und Eisen,* v. 74, no. 21, Oct. 7, 1954, p. 1334-1342.)

Previously abstracted from original. See item 392-F, 1954. (F1, F27, ST)

45-F. **How to Select Size of a Rolling Mill Drive Motor.** A. J. Winchester. *Blast Furnace and Steel Plant,* v. 43, Jan. 1955, p. 60-64.

Factors to be considered; examples of typical installations. Photographs, graphs, tables. (F23)

46-F. (Polish.) **New Methods of Investigating the Relative Movement of Metal Surfaces in Contact With Rolls.** Jerzy Bazan. *Hutnik,* v. 21, no. 10, Oct. 1954, p. 316-320.

Apparatus and techniques. Diagrams, table. 8 ref. (F23)

G

Secondary Mechanical Working

41-G. **Plastic Working of Metals.** W. S. Wagner. *American Society of Mechanical Engineers, Paper no.* 54-A-64, 1954, 9 p. + 2 plates.

Review of the art; effects of temperature, work hardening, deformation strength and aging; relationships of stress-strain data and plastic working. Tables, graphs. 5 ref. (G general, Q23)

42-G. **Surface Damage in Grinding of Steel.** Robert L. Kamm. *Australasian Engineer,* 1954, Nov., p. 62-70.

Types of injuries with reference to the fundamental mechanics of the grinding process and aspects of heat treatment and metallography involved. Corrective measures by control of metallurgical and grinding variables and of lubrication. Graphs, micrographs, tables, diagrams. 32 ref. (G18, CN, CI, AY, TS)

43-G. **Titanium Tips.** Dave Adams. *Aviation Age,* v. 23, Jan. 1955, p. 66-73.

Comprehensive study to determine best methods for fabricating titanium by analyzing all processes involved in sheet metal fabrication. Photographs. (G general, Ti)

44-G. **Why Stainless Is Hard to Cold Head.** W. M. Baldwin, Jr., and C. A. Beiser. *Iron Age,* v. 175, Jan. 13, 1955, p. 82-85.

Effects of deformation rates on embrittlement of 12 iron-nickel-chromium alloys. Photographs, graphs, diagrams. (G10, Q23, SS)

45-G. **Spinforming Stainless Steel.** A. Roland Teiner. *Machine Design,* v. 27, Jan. 1955, p. 148-153.

Basic design and production considerations for spun parts. Photographs, diagrams. (G13, SS)

46-G. **Machining Forged Titanium 150A.** *Machinery (London),* v. 85, Dec. 17, 1954, p. 1304-1311.

Measurements of drilling and cutting forces. Effects on tool life of shape, cutting speeds, feed rates, cutting lubricants and coolants. Tables, photographs, graphs, diagrams. (G17, Ti, CN, Ni)

47-G. **How to Machine Titanium.** H. Jack Siekmann. *Tool Engineer,* v. 34, Jan. 1955, p. 78-82.

Suggested recommendations by understanding its behavior and by selection of carbide grades. Graphs, tables, photographs. (G17, Ti, C)

48-G. **Avoiding Tool Failures With Negative Rake.** Max Kronenberg. *Tool Engineer,* v. 34, Jan. 1955, p. 83-87.

Mathematical analysis of the actions of forces on cutting tools serves as an understanding to new application of coolants. Diagrams, graph, table. 3 ref. (G17, G21, C)

49-G. **Select the Right Grinding Wheel.** *Welding Engineer,* v. 40, Jan. 1955, p. 44-48.

Practical tips in proper wheel selection, based on the nature of abrasive, grain size, grade, hardness, structure and bond. Tables, photographs. (G18, Al, Cu, CI, Cn, TS, SS)

50-G. (French.) **Contribution to the Study of the Influence of the Preparation of Steel on the Suitability of Thin Sheets for Stamping.** G. Husson, J. Stremsdoerfer, L. Beaujard and J. Tordeux. *Institut de Recherches de la Sidérurgie, Publications,* ser. A, no. 81, Oct. 1954, 143 p.

Influence of ingot practice, rolling and heat treatment variations on forming characteristics and mechanical properties of steel sheet. Micrographs, tables, graphs, photographs, diagrams. (G3, J general, Q general, CN)

51-G. (German.) **Hydromatic Drawing Process.** M. Nickels. *VDI Zeitschrift des Vereines deutscher Ingenieure,* v. 96, no. 35, Dec. 11, 1954, p. 1165-1167.

Details and advantages of the Kranenberg drawing process, based on embedding the blank directly into the pressure liquid. Diagrams, photographs. (G4, Al)

52-G. (Russian.) **New Method for Determining the Components of a Cutting Force in Turning.** P. G. Terlikov. *Vestnik Mashinostroeniia,* v. 34, no. 11, Nov. 1954, p. 42-48.

Variables to be considered and measuring techniques. Tables, diagrams, photograph, graphs. 3 ref. (G17)

53-G. **Cope Talks on Draw Dies. XXIII. Progressive Dies Can Make Deep Shells.** Stanley R. Cope. *American Machinist,* v. 99, Jan. 17, 1955, p. 112-115.

Holding partially formed parts; use of pressure pads; location of punches; use of downward and upward drawing. Diagrams. (To be continued.) (G4)

54-G. **The Development of the Basic Converter Process in Europe.** A. Desoer, F. Vanderstrick and J. Wurth. *Blast Furnace and Steel Plant,* v. 43, Jan. 1955, p. 45-53.

Experimental data on suitability of oxygen blown steel for deep drawing applications. Graphs, tables, photographs. 17 ref. (G4, D3, CN)

55-G. **Studies in Cold-Drawing. I. Effect of Cold-Drawing on Steel. II. Cold-Working 2S-O Aluminum.** H. Majors, Jr. *ASME, Transactions,* v. 77, Jan. 1955, p. 37-56; disc., p. 47-48.

Hardness, torsion and tension properties; residual stresses; microstructure; fatigue data. Tables, graphs, micrographs, diagrams, photographs. 25 ref. (G4, Q general, CN, Al)

56-G. **Measurement of Effectiveness of Cutting Oils.** F. Eugene. *Scientific Lubrication,* v. 7, Jan. 1955, p. 24-29.

Influence of lubricant on cutting temperature, tool wear and specific work of cutting. Diagrams, tables, micrographs, graph. (G21)

57-G. **How To Simplify Stainless Steel Grinding.** John Clark, Jr. *Tooling and Production,* v. 20, Jan. 1955, p. 79, 82, 87.

Methods devised by Norton Company. Photographs, tables.
(G18, SS)

58-G. (Book.) **Living Crafts.** G. Bernard Hughes. 192 p. 1954. Philosophical Library, Inc., 15 East 40th St., New York 16, N. Y. $4.75.

Review of ancient crafts that are currently practiced because no better methods have been found. Covers beating of gold leaf, silversmithing, working of pewter, and various processes for nonmetallic materials.
(G general)

H

Powder Metallurgy

23-H. Sintered Aluminium Powder. R. Irmann. *Engineers' Digest,* v. 15, Dec. 1954, p. 514-516. (From *Schweizer Archiv,* v. 20, no. 10, Oct. 1954, p. 327-334.)

Previously abstracted from original. See item 13-H, 1955.
(H15, H11, P general, Q general, Al)

24-H. Friction and Lubrication in Powder Metallurgy. Henry H. Hausner and Irving Sheinhartz. *Metal Powder Association, Proceedings,* v. 1, 1954, p. 6-26; disc., p. 26-27.

Evaluation of friction and lubrication variables in the production of powder metal parts. Diagram, graphs, tables, photograph, micrographs. 26 ref. (H13)

25-H. The Non-Destructive Testing of Sintered Brass Parts. Julian Rossnick. *Metal Powder Association, Proceedings,* v. 1, 1954, p. 39-41; disc., p. 42-43.

Use of inductance bridge to determine crush strength of sintered parts. Photographs, diagrams, graph. (H11, Cu)

26-H. Powder Metallurgy in the Automotive Industry. Joseph Geschelin. *Metal Powder Association, Proceedings,* v. 1, 1954, p. 44-49; disc., p. 50.

Compositions and processing variations for typical applications. Tables. (H general, T21)

27-H. Aircraft Applications for Powder Metallurgy. William H. Woodward. *Metal Powder Association, Proceedings,* v. 1, 1954, p. 51-55; disc., p. 55.

Savings possible by use of powdered metals in experimental and production parts for aircraft. Graphs, diagrams, tables.
(H general, T24)

28-H. Powder Metallurgy Versus Other Precision Forming Methods. Mathias M. Check. *Metal Powder Association, Proceedings,* v. 1, 1954, p. 56-58.

Advantages of powder metallurgy for production of precision parts.
(H general)

29-H. The Manufacture of Sheet Metals From Metal Powder. W. D. Jones. *Metal Powder Association, Proceedings,* v. 1, 1954, p. 60-65; disc., p. 66-67.

Continuous powder fabrication methods and possible applications. Photographs. (H14)

30-H. Semi-Formed Drawing Stock by Powder Metallurgy. Robert Steinitz and Frank I. Zaleski. *Metal Powder Association, Proceedings,* v. 1, 1954, p. 72-76; disc., p. 76.

Advantages and properties of preformed iron powder compacts for deep drawing of cartridge cases. Photographs, tables. (H14, G4, Fe)

31-H. Note on the Relationship Between Brittleness and Microstructure of Cermets. P. Schwarzkopf and W. Leszynski. *Powder Metallurgy Bulletin,* v. 7, Dec. 1954, p. 19-21.

Possibilities of producing a shock-resistant material. 2 ref.
(H general, Q23, M27)

32-H. The Friability Test as a Method of Evaluating Sinter Cake. I. Sheinhartz and H. M. McCullough. *Powder Metallurgy Bulletin,* v. 7, Dec. 1954, p. 22-24.

Detection of chemical impurities and inclusions before final processing of metal powders. Table, graphs. (H15)

33-H. (Czech.) **Direct Carbidization of Tungsten Trioxide.** Curt Agte and Josef Hruska. *Hutnické Listy,* v. 9, no. 11, Nov. 1954, p. 642-646.

Economic importance and conditions for direct production of tungsten carbide. Tables, graphs. 12 ref. (H10, WC)

34-H. (German.) **Effect of Particle Size on the Grain Growth of Sintered Metal.** Kazuhiko Ogawa, Gentaro Matsumura and Daizo Okubo. *Monatshefte für Chemie,* v. 85, no. 6, 1954, p. 1281-1286.

Review of literature and experimental data with powders ranging from 0.5 to 43 m. Tables, micrographs, graph. 18 ref. (H11, N3)

35-H. Metal Powders for Engineering Purposes: A Review. W. D. Jones. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group I, p. 1-7 + 1 plate.

Manufacture and relative properties of powders. Micrographs. 21 ref. (H10, H11)

36-H. The Grinding of Metal Powders. G. F. Hüttig and H. Sales. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group I, p. 8-10.

Effects of metal properties and grinding variables on grinding results; mechanical properties of sintered steel were improved by decreasing grain size of the powder. Graphs.
(H10, Q general, Cu, Zn, Al, Fe, W)

37-H. The Production and Fabrication of Tantalum Powder. R. Titterington and A. G. Simpson. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group I, p. 11-18 + 1 plate.

Commercial methods; sintering; cold working of compacts; heat treatment. Tables, photograph, graphs, micrographs. 10 ref.
(H general, Ta)

38-H. The Powder Metallurgy of Zirconium. F. G. Cox and G. L. Miller. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group I, p. 19-24.

Production methods, compacting and applications. Handling precautions. Tables, diagrams, graph. 12 ref. (H general, Zr)

39-H. Powders for Magnetic Applications. G. R. Polgreen. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group I, p. 24-29.

Production of iron and iron alloy powders; advantages of powders for permanent magnets. Table, graphs, diagram. (H10, SG-n, Fe)

40-H. Recent Developments in Testing Metal Powders. G. R. Bell. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group I, p. 30-37.

Comparison of test methods; evaluation of inherent errors. 107 ref. (H general)

41-H. Application of Particle Size Analysis to the Quality Control of Metal Powders. V. T. Morgan. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group I, p. 38-43.

Apparatus for estimating particle size distribution. Effects of subsieve particle sizes on properties of copper, tin and iron-copper powders. Diagram, tables, graphs, photograph. (H11, S12, Cu, Sn, Fe)

42-H. Determination of the Gas Contents of Materials of Powder-Metallurgy Practice. H. A. Sloman. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group I, p. 44-49.

Equipment and techniques. Analyses of various powders. Table. 16 ref. (H11)

43-H. The Mechanism of Infiltration. Paul Schwarzkopf. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group II, p. 1-4 + 1 plate.

Defines two stages of infiltration; structural changes during liquid-phase sintering. Micrographs. 10 ref. (H16, H15)

44-H. The Sintering Mechanism of Pure Metals, Including 'Activated Sintering'. M. Eudier. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group II, p. 5-9 + 2 plates.

Effects of sintering variables; accelerated method. Graphs, diagram, micrographs, photograph. 7 ref. (H15)

45-H. The Variation of Thermoelectric Force During Sintering. Günther Ritzau. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group II, p. 9-13.

Isothermal change of thermo-e.m.f. of 50-50 copper-nickel mixture indicates progress of the diffusion process. Graphs, table. 3 ref.
(H15, N1, P15, Cu, Ni)

46-H. The Designation of Powders and Sintered Materials by Means of the Properties of the Pore Volume. K. Torkar and G. F. Hüttig. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group II, p. 14-17.

Use of gas diffusion and gas permeability to evaluate structures and sintering behavior. Table, micrograph. 14 ref. (H11, H15)

47-H. Pore-Size Distribution and Permeability of Porous Metal Materials. P. R. Marshall. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group II, p. 17-26.

Use of capillary rise of a liquid to evaluate sintered compacts. Diagrams, graphs, tables. 11 ref. (H11)

48-H. Filter Elements by Powder Metallurgy. V. T. Morgan. *Iron and Steel Insttiute, Preprints of Symposium Papers,* Dec. 1954, Group II, p. 27-35 + 2 plates.

Characteristics of compacts produced from spherical powders. Effects of interparticle welding on mechanical and physical properties. Tables, photographs, graphs. 10 ref.
(H14, Q general, P general)

49-H. Relationships Between the Properties of Iron Powders and Powder Compacts. F. V. Lenel, H. D. Ambs and E. O. Lomerson, Jr. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group II, p. 36-42 + 2 plates.

Data from laboratory-produced powders. Effects of processing variables. Graphs, tables, micrographs. 10 ref. (H11, Fe)

50-H. Pressing Characteristics of Air-Atomized Copper Powder. A. Duffield and P. Grootenhuis. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group II, p. 42-47.

Effects of particle size and size distribution on initial filling density and repacking. Diagrams, tables, graphs. 16 ref. (H14, Cu)

51-H. Grain Growth During Sintering. Henry H. Hausner. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group II, p. 48-58 + 4 plates.

Principles; variables influencing recrystallization; behavior of zirconium and beryllium. Diagram, micrographs, graphs, tables. 27 ref. (H15, N3, N5, Zr, Be)

52-H. The Hot Compacting of Metal Powders. J. Williams. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group II, p. 58-70.

Dilatometric measurements of copper, iron, aluminum, thorium, zirconium, silver, magnesium and beryllium show a two-stage process of densification. Graphs, diagram, tables. 19 ref.
(H14, Cu, Al, Th, Zr, Ag, Mg, Be)

53-H. The Continuous Compacting of Metal Powders. P. E. Evans and G. C. Smith. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group II, p. 77-82 + 3 plates.

Compacting of copper powder by direct rolling to produce a continuous strip. Effects of rolling and sintering variables on mechanical properties. Diagrams, graphs, micrographs. 16 ref.
(H14, Q general, Cu)

54-H. Effect of Small Boron Contents on the Properties of Compacts Prepared by Vacuum Sintering. F. Frehn and W. Hotop. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group II, p. 83-89 + 4 plates.

Advantages of vacuum sintering; effects of boron on density and magnetic properties of iron and Alnico. Micrographs, tables. 10 ref. (H15, H11, P16, Fe, Al, Ni, Co)

55-H. Sintering Furnace Atmospheres. L. D. Brownlee, R. Edwards and T. Raine. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group II, p. 89-94.

Types of atmospheres; control methods; types of furnaces. Tables, diagrams, photograph. (H15)

56-H. Some Developments in Sintered Structural Parts. C. J. Leadbeater. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group III, p. 1-11 + 4 plates.

American and European developments in production and design of parts from alloy-infiltrated iron, alloy steels, brass and aluminum alloys. Tables, graphs, photographs, micrograph. 24 ref.
(H general, Fe, AY, SS, Cu, Al)

57-H. Experiments on the Production of High-Strength Material and Parts by Powder Metallurgy. L. Harrison and S. Marton. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group III, p. 11-19 + 1 plate.

Advantages and disadvantages of three methods of production. Tables, graphs, micrographs. 7 ref.
(H general)

58-H. Sintered Nickel Steel and Notes on Other Sintered Alloys. S. C. Wilsdon and P. J. Ridout. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group III, p. 20-26 + 2 plates.

Production techniques; effects of alloy additions and sintering variables on mechanical properties. Tables, photographs, graphs, micrographs. (H15, Q general, AY)

59-H. Solid Stainless-Steel Compacts From 18-8 Austenitic Powders. B. Sugarman. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group III, p. 27-31 + 3 plates.

Standard 18-8 powder produced the strongest compacts; effects of compacting load on mechanical properties. Tables, graphs, diagram, micrographs. 6 ref.
(H14, Q general)

60-H. Porous Stainless Steel. D. A. Oliver, S. C. Wilsdon, P. R. Marshall, B. Sugarman, G. Collins and C. T. J. Jessop. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group III, p. 32-46.

Production of 18-8 powder by electrochemical disintegration; applications of compacts; mechanical properties. Graphs, micrograph, tables, photographs. 14 ref.
(H10, Q general, SS)

61-H. The Porosity and Air Permeability of Sintered Iron and Iron-Copper. C. J. Leadbeater and S. Turner. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group III, p. 47-52.

Effects of compacting pressures, copper content and particle size on permeability coefficients. Diagram, graphs. 5 ref. (H14, H11, Fe, Cu)

62-H. Low-Expansion Nickel-Iron Alloys Prepared by Powder Metallurgy. V. Thomas and D. J. Jones. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group III, p. 52-55 + 1 plate.

Use of powder metal techniques to study expansion characteristics of alloys. Photograph, table, graphs, micrographs. 3 ref.
(H general, P11, Fe, Ni)

63-H. Application of Powder Metallurgy to the Production of High-Permeability Magnetic Alloy Strip. E. V. Walker, D. K. Worn and R. E. S. Walters. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group III, p. 56-60 + 1 plate.

Comparison with magnetic properties of conventional strip; effects of production variables on permeability. Tables, graph, micrographs.
(H general, P16, Fe, Ni, Mo, Cu)

64-H. Production of Sintered Copper-Lead Bearing Material. W. E. Duckworth. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group III, p. 65-70 + 2 plates.

Advantages of sintering over casting. Importance of surface forces on sintering. Photographs, diagrams, graphs, micrographs. 15 ref. (H15, Cu, Pb)

65-H. Properties and Testing of Sintered Copper-Lead Bearing Materials. P. G. Forrester and W. E. Duckworth. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group III, p. 71-73 + 1 plate.

Control procedure for obtaining desired properties. Table, diagram, graph, micrographs. 6 ref.
(H general, Q general, Cu, Pb)

66-H. Fluon-Impregnated Self-Lubricating Bearing Materials. A. Blainey. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group III, p. 74-87 + 1 plate.

Preparation and testing of true oilless bearings. Diagrams, tables, graphs, micrographs.
(H16, Cu, Fe, Sn, SS)

67-H. Preparation of High-Modulus Aluminum Alloys by Powder Metallurgy. N. F. Macdonald and C. E. Ransley. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group III, p. 94-100 + 1 plate.

Production, properties and limitations of compacts containing a second phase with high modulus. Tables, graphs, micrographs. 6 ref.
(H general, Q general, Al)

68-H. Powder Metallurgy of Magnesium. D. J. Brown. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group III, p. 100-104.

Types of powder and production methods; extrusion methods; typical mechanical properties. Tables. 11 ref. (H11, Q general, Mg)

69-H. Developments in High-Density Alloys. E. C. Green, D. J. Jones and W. R. Pitkin. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group IV, p. 1-4 + 2 plates.

Manufacturing procedures for tungsten-nickel-copper and tungsten-nickel-iron alloys; mechanical properties. Tables, micrographs.
(H general, Q general, W, Ni, Cu, Fe)

70-H. The High-Temperature Strength of Some Co—Ni—Fe—Cr—Base Materials Made by Powder Metallurgy. G. T. Harris and H. C. Child. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group IV, p. 5-12.

Effects of composition on creep strength at 850° C. Tables, graphs. 5 ref. (H general, Q23, Cr, Ni, Fe, Cr)

71-H. Preparation and Properties of Titanium and Titanium Alloys Prepared by Sintering. D. A. Robins, W. R. Pitkin and I. Jenkins. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group IV, p. 12-19 + 1 plate.

Preparation of chromium and molybdenum-containing alloys; mechanical properties. Tables, diagrams, graphs, micrographs. 11 ref.
(H general, Q general, Ti, Cr, Mo)

72-H. Sintered Titanium Carbide Alloys. E. M. Trent and A. Carter. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group IV, p. 20-24 + 1 plate.

Bonding of titanium carbide with nickel and cobalt; creep and oxidation resistance; methods of manufacture. Graphs, tables, micrographs. 14 ref.
(H general, Q3, R2, TiC)

73-H. The Testing of Ceramal Materials With Particular Reference to a Simple Titanium-Carbide—Cobalt Material. T. W. Penrice and D. H. Shute. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group IV, p. 25-29 + 1 plate.

Effects of composition and binder segregation on mechanical properties. Diagrams, table, photograph, graphs, micrographs. 4 ref.
(H general, Q general, Co, TiC)

74-H. The Creep Strength of Titanium Carbide Base Materials. G. T. Harris, H. C. Child and J. F. Howard. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group IV, p. 30-40.

Heat resisting alloys are better binders than nickel or cobalt; effects of other carbide additions. Diagram, graphs, tables. 13 ref.
(H12, Q23, Ni, Co, TiC)

75-H. Silicides of the Transition Metals of the 4th, 5th, and 6th Groups of the Periodic Table. R. Kieffer and F. Benesovsky. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group IV, p. 40-49 + 2 plates.

Preparation; equilibrium diagrams of binary and ternary systems; scaling behavior of several silicides. Tables, graphs, photographs. 47 ref. (H general, M24, Si, Ti, Zr, Hf, V, Nb, Ta, Cr, Mo, W)

76-H. Effect of Carbon Content on the Properties of Tungsten-Carbide-Cobalt Hard Metal. L. D. Brownlee, R. Edwards and T. Raine. *Iron and Steel Institute, Preprints of Sym-*

posium Papers, Dec. 1954, Group IV, p. 50-52 + 1 plate.

Structural and mechanical property changes with variation of carbon content from the theoretical requirement. Graph, table, diagram, micrographs, photograph. 3 ref. (H11, M general, Q general, Co, WC)

77-H. Chromium Carbide in Hard-Metal Alloys. J. Hinnüber and O. Rüdiger. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group IV, p. 53-58 + 1 plate.

Effects of chromium carbide additions on mechanical and corrosion properties of cermets. Tables, graphs, micrographs. 18 ref. (H12, Q general, R general, Cr, C-n)

78-H. Metal-Ceramic Bodies. A. E. S. White, F. K. Earp, T. H. Blakeley and J. Walker. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group IV, p. 59-62.

Selection of metals and ceramics for specific property combinations. Micrograph, tables, graphs. (H general)

79-H. Development of Metal-Ceramics From Metal-Oxide Systems. J. R. Baxter and A. L. Roberts. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group IV, p. 63-72 + 5 plates.

Requirements for satisfactory combinations; behavior of nickel and cobalt alloys with sintered alumina; silver-cuprous oxide-alumina constitutes a "model system". Tables, graph, micrographs, photographs. 26 ref. (H12, Ni, Co, Ag)

80-H. The Rupture-Strength of Some Metal-Bonded Refractory Oxides. G. T. Harris and H. C. Child. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group IV, p. 73-78 + 1 plate.

Test data on several refractory oxides bonded with cobalt, nickel, chromium, iron or their alloys. Diagram, graph, tables, micrographs. 9 ref. (H general, Q23, Co, Ni, Cr, Fe)

81-H. Influence of Additives in the Production of High Coercivity Ultra-Fine Iron Powder. Edward W. Stewart, George P. Conard, II, and Joseph F. Libsch. *Journal of Metals,* v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 152-157.

Effects of several additives during hydrogen reduction of ferrous formate on sintering and magnetic properties of the powder. Tables, graphs. 19 ref. (H10, P16, Fe)

82-H. Resistance Sintering Under Pressure. F. V. Lenel. *Journal of Metals,* v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 158-167.

Equipment; required characteristics of powder and compacts; temperature distributions; gas reactions; potential commercial applications of process. Photographs, diagram, graphs, tables, micrographs. 7 ref. (H15)

83-H. (English.) **The Interaction of Various Reactions During Sintering.** Henry H. Hausner. Paper from "International Symposium on the Reactivity of Solids, Gothenburg 1952, Proceedings". Ingeniörsvetenskapsakademien and Chalmers Tekniska Högskola, p. 1051-1059; disc., p. 1060.

Mechanisms of particle bonding in zirconium and iron powders. Graph, micrographs, tables. 8 ref. (H15, Zr, Fe)

84-H. (German.) **High-Temperature Materials Produced by Powder Metallurgy.** Paul Schwarzkopf. Paper from "International Symposium on the Reactivity of Solids, Gothenburg 1952, Proceedings". Ingeniörsvetenskapsakademien and Chalmers Tekniska Högskola, p. 1027-1040; disc., p. 1040-1041.

Study of materials showing satisfactory mechanical strength and scaling resistance at temperatures above 800° C. Graphs, photographs. 18 ref. (H general, Q23)

85-H. (German.) **The Adhesive Capacity of Powders.** E. Cremer. Paper from "International Symposium on the Reactivity of Solids, Gothenburg 1952, Proceedings". Ingeniörsvetenskapsakademien and Chalmers Tekniska Högskola, p. 1043-1048; disc., p. 1048-1049.

Theory of slippage of powders; application to experiments with magnesite; development of a method for grain-size measurements. Graphs, table. 6 ref. (H11, M27)

86-H. (German.) **Pores in Sintered Bodies in the Bragg Soap-Bubble Model.** Josef Heuberger. Paper from "International Symposium on the Reactivity of Solids, Gothenburg 1952, Proceedings". Ingeniörsvetenskapsakademien and Chalmers Tekniska Högskola, p. 1061-1064; disc., p. 1064.

Application of the Bragg experiments to observing the shrinking of pores on sintered bodies. Photographs. (H15)

87-H. (German.) **Magnetic Investigation of Homogenization of an Alloy During Sintering.** Werner Köster. Paper from "International Symposium on the Reactivity of Solids, Gothenburg 1952, Proceedings". Ingeniörsvetenskapsakademien and Chalmers Tekniska Högskola, p. 1069-1076; disc., p. 1076-1077.

Theory of the magnetic analysis of the sintering process; determination of the concentration distribution curve from the magnetization-temperature curves; sintering isotherms for nickel, copper and zinc. Graphs. 5 ref. (H15, P16, Ni, Cu, Zn)

88-H. (German.) **Carbide Formation During the Sintering of Complex Iron-Carbon Systems.** Emma-Maria Onitsch-Modl. Paper from "International Symposium on the Reactivity of Solids, Gothenburg 1952, Proceedings". Ingeniörsvetenskapsakademien and Chalmers Tekniska Högskola, p. 1079-1092; disc., p. 1092.

Investigation on powder mixtures of iron, carbon, chromium, tungsten, molybdenum and vanadium. Individual stages of carbide formation depending upon the temperature. Micrographs, graph, diagrams, table. 10 ref. (H15, Fe, Cr, W, Mo, V)

89-H. (Book.) **Powder Metallurgy 1954.** 312 p. The Iron and Steel Institute, 4 Grosvenor Gardens, London SW1, England. £3.5.0.

Contains 50 papers covering manufacture, properties, and testing of powders; principles and control of compacting and sintering; manufacture and properties of structural engineering components; and powder metallurgy of high-melting-point materials. Individual papers are separately abstracted. (H general)

J

Heat Treatment

45-J. Principles in the Heat Treatment of High Alloy Tool Steels. J. G. Ritchie. *Australasian Engineer,* 1954, Nov., p. 52-61.

Features of the equilibrium diagrams and their effect on hot working characteristics and directional properties. Reactions involved in hardening and tempering; selecting suitable heat treatment method. Micrographs, tables, graphs. 30 ref. (J general, TS)

46-J. Sixty-Cycle Induction Heating of Large Steel Sections for Hot Forming. II. C. H. Hartwig. *Industrial Heating,* v. 21, Dec. 1954, p. 2522 + 5 pages.

Temperature, current and power curves for heating ingots to rolling temperature. Graphs, tables, photograph. (To be continued.) (J2, F21, CN, SS, AY, TS)

47-J. Below Zero Chilling Toughens Metals, Increases Tool Life. Victor Morris. *Machine and Tool Blue Book,* v. 50, Jan. 1955, p. 124-130, 132, 134.

Development, applications and advantages of the new industrial process in the field of metal stabilization. Graphs, photographs, table. (J2, TS, AY, W, SS, Al, Mg, Cu)

48-J. Improvement of Case Hardened Parts by Controlling Internal Stresses. Jacques Pomey. *Metal Progress,* v. 67, Jan. 1955, p. 147-153.

Proper compressive stresses at and near the surface which raise endurance limit by 40% can be put into a machine part by carbonitriding followed by heat treatments which produce either a bainitic core, a pearlitic core or a slightly spheroidized core, yet retain a surface approaching 1000 Vickers hard. Graphs, diagram, micrograph. (J28, Q25, ST)

49-J. New Heat Treating Equipment in Great Britain. Tom Bishop. *Metal Progress,* v. 67, Jan. 1955, p. 154-158.

Annealing of aluminum foil without crinkling, heat treating clad aluminum in salt baths without staining, continuous flash annealing are a few of the nonferrous developments cited; on the ferrous side, the author describes a "drip-feed" liquid for generating a carburizing atmosphere, and a scale-free heating method not yet in use in this country. Photographs, table. (J23, J2, J28, Al)

50-J. Alcohol Makes a Furnace Atmosphere. Milo J. Stutzman. *Steel,* v. 136, Jan. 17, 1955, p. 94, 96.

Heating of isopropyl alcohol-water mixtures produces carburizing or protective atmospheres which are easy to control. Photographs. (J2)

51-J. (Polish.) **Heat Treatment Methods for Surface Hardening of Rail Ends.** K. Pogorecki. *Hutnik,* v. 21, no. 8, Aug. 1954, p. 265-271.

Heating with oxy-acetylene flame; induction heating; tempering using heat of rolling. Graphs, tables, diagrams, photographs. 7 ref. (J28, J2, J29, CN)

52-J. Induction Heating Fixtures. D. Warburton-Brown. *Machinery Lloyd (Overseas Ed.),* v. 26, Dec. 18, 1954, p. 71-86.

Work coil is focal point of tooling. Diagrams, graphs. (J2)

53-J. How to Obtain High Quality Carburized Cases. H. E. Mansfield. *Materials & Methods,* v. 41, Jan. 1955, p. 134-137.

Optimum properties are obtained with a slightly hypereutectoid structure. Photograph, micrographs. (J28, ST)

54-J. Heat Treatment and Mechanical Properties of Ti-Cu Alloys. F. C. Holden, A. A. Watts, H. R. Ogden and R. I. Jaffee. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 117-125.

Variations and control of heat treatment to produce desired struc-

tures and mechanical properties. Transformation products are similar to those of carbon steel. Graphs, micrographs, table. 3 ref.
(J general, N9, Q general, Ti, Cu)

55-J. Heat Treating Tool Steels. Water Hardening Types. Oil and Air Hardening Types. H. C. Manley and G. E. Brumbach. *Steel,* v. 136, Jan. 24, 1955, p. 70-73; Jan. 31, 1955, p. 72-74; Feb. 7, 1955, p. 111-114; Feb. 14, 1955, p. 87-90.

Effects of alloying elements on properties. Heat treating procedures. Transformations. Photographs, graphs. (To be continued.)
(J general, Q general, N8, TS)

56-J. (Polish.) **Patenting of Steel Wires.** Zygmunt Steininger. *Wiadomosci Hutnicze,* v. 10, no. 12, Dec. 1954, p. 343-347.

Lead, salt and air methods and resulting structural changes. Mistakes to avoid. Graphs, diagram, micrographs. 15 ref. (J25, ST)

K

Joining

64-K. Welding of Carbon Steels by the Argonaut Process. H. F. Tremlett and A. W. Stones. *British Welding Journal,* v. 1, Dec. 1954, p. 541-548.

Investigates production of welds free from porosity and strong enough for joining high-quality killed and semikilled mild steels. Photograph, tables, micrograph.
(K1, Cu, CN, ST)

65-K. Fusion Welding of Aluminum Alloys. V. A Mathematical Examination of the Effect of Bounding Planes on the Temperature Distribution Due to Welding. Doris K. Roberts and A. A. Wells. *British Welding Journal,* v. 1, Dec. 1954, p. 553-560.

Using the principle of image sources and a numerical method, it is shown that a weld test plate should have a half-width of not less than ten melted widths to give a reasonable approximation to the thermal conditions in an infinite plate. Graphs, table, diagram. 4 ref. (K9, Al)

66-K. Improved Welding Techniques Produce Lighter, Stronger Chain. Harry F. Reid. *Industry & Welding,* v. 28, Jan. 1955, p. 33-35, 68.

Major and minor welding techniques in chain making. Photographs. (K general, CN, AY)

67-K. Production Brazing Aluminum. Charles A. McFadden. *Industry & Welding,* v. 28, Jan. 1955, p. 50-52, 56-57.

New process for joining aluminum-sheathed nichrome coils to appliances; application in the aircraft industry. Photographs. (K8, Al)

68-K. Welding Research for Higher Efficiency, Lower Costs. Orville T. Barnett. *Industry & Welding,* v. 28, Jan. 1955, p. 58, 60-63.

Fundamental and practical projects at Armour Research Foundation include work with recrystallization welding of aluminum; arc and resistance welding of various metals. Photograph.
(K1, K3, Al, Ti)

69-K. Advances in Welding in Britain. E. Bishop. *Metal Progress,* v. 67, Jan. 1955, p. 121-125.

Adoption of wartime gains in welding is everywhere evident in Britain. Much interest has been stirred by new concepts in the design of welded structures and the improvement of weldability of high-tensile steels. Among other advances are electrodes that give crack-free deposits, a stitch welder having double the usual welding speed, and the use of twin-cored electrodes to speed manual arc welding. Photographs. (K9, K1, K3, ST)

70-K. Successful Manufacture and Use of All-Austenitic Welding Electrodes. Egon Kauhausen and H. A. Vogels. *Metal Progress,* v. 67, Jan. 1955, p. 129-136.

Evidence for belief that cracks of all kinds, however named, in austenitic welds are due to grain-boundary inclusions. Crack-free welds, heavy and light, all austenitic, are in long, severe service. Electrodes are made of clean 16-13 Cr-Ni-Cb steel, under special electric furnace practice. Deoxidizers may sometimes need to be added to the basic lime-fluorspar coatings. Design and construction should also minimize residual stresses. Tables, photographs, micrographs, graphs.
(K1, Q25, SS)

71-K. The Influence of "Joint Design" on "Solderability". G. L. J. Bailey. *Sheet Metal Industries,* v. 32, no. 333, Jan. 1955, p. 47-57; disc., p. 57.

Nature of relationship; evaluation of effects of prior roughening, alloy formation and precipitation from the flux on value of contact angle. Graphs, table, diagrams, micrographs. 3 ref. (K7, Sn, Pb, Cu)

72-K. New Developments in Metal-Ceramic Seals. Harry Bender. *Sylvania Technologist,* v. 8, Jan. 1955, p. 22-26.

Telefunken process, hydride method and "active alloy" technique. Micrographs, table. 33 ref. (K11)

73-K. Bare Wire to "Coilex". D. B. J. Thomas. *Welder,* v. 23, July-Sept. 1954, p. 182-186.

Progress, from use of bare wire to development and applications of a new continuous extruded electrode for automatic arc welding. Photographs, tables. (K1, CN)

74-K. (German.) **The Danger of Breakage of Welded Structures.** E. Uhlir. *Schweisstechnik,* v. 8, no. 6, June 1954, p. 61-64; nos. 7-8, July-Aug. 1954, p. 77-79.

Theoretical basis; processes for prevention; elimination of stresses; determination of breakage tendency. Graph, micrographs, diagrams.
(K general, Q25, CN, Cu, Mo)

75-K. (German.) **Welding Under Protective Gas.** Alfred Schmidt. *Schweisstechnik,* v. 8, no. 6, June 1954, p. 64-70.

Type of current for argon-arc welding of aluminum and aluminum alloys; welding of stainless and heat resistant steels; joining with other metals; deposition and spot welding. Tables, photographs.
(K general, Al, SS, Mg, Cu, Ag, CI, Cr)

76-K. (German.) **Welding Electrodes.** W. Hummitzsch. *Schweisstechnik,* v. 8, nos. 7-8, July-Aug. 1954, p. 73-77.

High-grade coated electrodes and their characteristics. Graphs, photographs. 5 ref. (K1)

77-K. (German.) **The Effect of Nitrogen in Electric Arc Welds.** Werner Hummitzsch. *Stahl und Eisen,* v. 74, no. 26, Dec. 16, 1954, p. 1723-1730.

Behavior of nitrogen in molten and solid weld metal; effects on mechanical properties. Tables, photographs, graphs, micrographs. 20 ref. (K1, Q general, ST)

78-K. (German.) **Development and Applications of Resistance Butt Welding.** Heinz Neumann. *Schweissen und Schneiden,* v. 6, no. 11, Nov. 1954, p. 439-447.

Differences and applications of flash and pressure butt welding, with possibilities of mechanizing the former. Graphs, diagrams, photographs, spectrograph.
(K3, CI, ST, AY, Cu, Al)

79-K. Rubber-Based Adhesives. A. A. Round. *Institution of the Rubber Industry, Transactions,* v. 30; *Proceedings,* v. 1, June 1954, p. 72-80.

Natural tack, flexibility of bond and versatility of adherance. (K12)

80-K. New Heat Resistant Adhesives for Metal Bonding. George Epstein. *Materials & Methods,* v. 41, Jan. 1955, p. 107-110.

Two compositions suitable for structural applications at temperatures as high as 600° F. Photographs, graph, tables. (K12)

81-K. Investigation of Adhesives; Metal-to-Metal Bonding. Jack F. Furrer. *U. S. Department of Commerce, Office of Technical Services,* PB 111445, Jan.-June 1953, 10 p.

Resinous-type adhesives for use in bonding galvanized steel screens to cold rolled shrouds in tail-fin assembly. Tables. (K11, K12, ST)

82-K. (German.) **Joining With Low Heat Consumption. Principles and Applications.** G. M. Blanc. *Giesserei,* v. 41, no. 26, Dec. 23, 1954, p. 700-703.

Fusion welding with the oxy-acetylene torch; silver brazing; diffusion phenomena; fluxes; special electrodes; advantages and practical examples. Micrographs, graphs, photographs. (K8, K2, ST, Ag)

83-K. (Russian.) **Toward the Wider Use of Projection Welding.** A. Z. Blitshtein, P. M. Sapov and B. Z. Feldman. *Sel'khozmashina,* 1954, no. 12, Dec., p. 22-25.

Determination of parameters; operation technique; strength of welds. Graphs, diagrams, tables, X-ray diffraction patterns. 1 ref. (K3)

84-K. Welding of High-Pressure Steam Pipes. J. G. M. Turnbull. *British Welding Journal,* v. 2, Jan. 1955, p. 19-26.

Reviews nondestructive testing of welds with special reference to gamma radiographic technique. Graphs, diagrams, micrographs, photographs, table. (K general, S13, ST)

85-K. The Metallurgy of Welding. J. Hinde. *British Welding Journal,* v. 2, Jan. 1955, p. 26-31.

Important aspects described for people whose connection with welding is not primarily metallurgical. Graph, diagrams. 11 ref.
(K general)

86-K. Fusion Welding of Aluminium Alloys, VI. Development of a Hot-Cracking Test for Light-Alloy Welds. W. G. Hull, D. F. Adams and H. E. Dixon. *British Welding Journal,* v. 2, Jan. 1955, p. 32-37.

Test weld is laid along an open-ended slot in a rectangular plate; severity of the test varies inversely as the slot length. Tables, diagram, photographs. (K9, Al)

87-K. Soft Soldering. II-III. E. A. Lancaster. *Canadian Metals,* v. 18, Jan. 1955, p. 43-44, 46-47; Feb. 1955, p. 43, 50-52.

Soldering techniques and typical applications. Diagram, table, photographs. 8 ref. (K7)

88-K. Welding the Copper-Base Alloys. Lester B. Spencer. *Heating, Air Conditioning, Sheet Metal Contractor,* v. 46, Jan. 1955, p. 124-132.

Modifications of methods used for mild steel. Photograph, tables.
(K general, Cu)

89-K. Welding Aluminum. Charles Bruno. *Heating, Air Conditioning, Sheet Metal Contractor,* v. 46, Jan. 1955, p. 136-141.

Although the most weldable metal, it requires special techniques. Tables, photographs. (K general, Al)

90-K. Adhesive Bonded Aircraft Structures. *National Bureau of Standards, Technical News Bulletin,* v. 39, Jan. 1955, p. 11-13.

Since small changes in fabricating process conditions can produce imperfections and since the only tests at this time are destructive, the acceptance of this method is restricted. Photographs. 2 ref. (K12, Al)

91-K. CO_2 Means Cheaper Gas-Shielded Welds. Thomas F. Hruby. *Steel,* v. 136, Jan. 31, 1955, p. 68-70.

Carbon dioxide as a replacement for argon or helium cuts costs up to 70%. Photographs, diagrams, table. (K2, ST)

92-K. (Book.) **International Acetylene Association Proceedings—1948, 1949, and 1950.** 496 p. 1954. International Acetylene Association, New York, N. Y.

A collection of 43 papers covering uses of oxyacetylene flames in welding, cutting, and surface hardening of metals. (K2, G22, J2)

L

Cleaning, Coating and Finishing

134-L. Zinc-Rich Paints. C. Finlay and C. T. Morley-Smith. *Corrosion Technology,* v. 1, Dec. 1954, p. 383-385.

Formulation, application methods, film properties, uses, zinc dust requirements. Tables, photographs, micrograph. (L26, Zn)

135-L. Aluminum Coating on Steel Cuts Corrosion. *Diesel Power,* v. 32, Dec. 1954, p. 29-31.

"Aldip" coating provides low alloy steels with exceptional resistance to chemical and high-temperature corrosion. Ability to treat shapes, after casting or fabrication, promises many advantages in improving life of certain diesel parts. Photographs, table. (L16, AY-n)

136-L. Finish Effects Obtainable on Stainless Steel. Richard E. Paret. *Electrical Manufacturing,* v. 55, Jan. 1955, p. 70-76.

Classifies mill finishes and describes wide variety of surface effects possible through mechanical and chemical treatments. Photographs. (L general, SS)

137-L. Electroplated Applications for Precious Metals. Isidore Cross and Perry J. Sloane. *Electrical Manufacturing,* v. 55, Jan. 1955, p. 96-99.

Desirable properties such as increased wear resistance and oxidation, or uniform conductivity, may be "plated on". Properties of electrodepositions and uses in contacts, wave guides, terminals and springs summarized. Tables, diagrams. 6 ref. (L17, Ag, Cu, Au, Al, Mg, Rh, Zn, Ni, Ru, Pt, Pd, Sn, Cr, Pb, Ti, Hg, Cd, Fe)

138-L. The Effect of Ultrasonic Waves on the Electrodeposition of Copper. W. R. Wolfe, Hyman Chessin, Ernest Yeager and Frank Hovorka. *Electrochemical Society, Journal,* v. 101, Dec. 1954, p. 590-596.

Determination made at frequencies of 200 and 100 kc. per sec. with acid-sulfate plating baths of various concentrations. Effects ascertained in terms of polarization measurements and X-ray diffraction data. Diagrams, graphs, X-ray pattern, Schlieren photographs. 17 ref. (L17, Cu)

139-L. A Theory of the Kinetics of Formation of Anode Films at High Fields. J. F. Dewald. *Electrochemical Society, Journal,* v. 102, Jan. 1955, p. 1-6.

Anodic oxidation of tantalum and aluminum. Graphs. 5 ref. (L19, Al, Ta)

140-L. Etch Primers. E. C. J. Marsh. *Electroplating and Metal Finishing,* v. 7, Dec. 1954, p. 466-468.

Chemistry and mechanism of action, with special reference to adhesion. Compares performance of single pack and two solution-type primers on various metals. Graphs, tables. (L14, Fe, Zn, Cd, Al, Sn, Ni, Cu, Cr, SS, CN)

141-L. High Temperature Ceramic Coatings. Alexander Pechman. *Industrial Finishing (London),* v. 7, Dec. 1954, p. 336-338, 340-345.

Refractories and techniques. Photographs, tables. (L27)

142-L. Steam Oxidizing Provides Better Paint Base. L. E. Raymond. *Iron Age,* v. 175, Jan. 13, 1955, p. 75-77.

Low cost surface treatment for steel and cast iron parts. Photographs. (L12, CI, ST)

143-L. Which Electroplate? J. B. Mohler. *Machine Design,* v. 27, Jan. 1955, p. 179-182.

Factors influencing selection of plated metals. Tables. 5 ref. (L17, Cd, Cr, Cu, Au, Fe, Pb, Ni, Rh, Ag, Sn, Zn)

144-L. Liquid Abrasive Blasting of Springs. H. J. Steel. *Machinery,* v. 61, Jan. 1955, p. 188-193.

Intricate surfaces can be reached, defects removed and fatigue life improved by process. Diagrams, photographs, graphs, table. (L10, Q7)

145-L. Modern Barrel Finishing. *Mechanical World and Engineering Record,* v. 134, Dec. 1954, p. 546-547.

Advanced technique assures uniformity of finish with low micro-in. surfaces in addition to being economical in operation. Graph, diagram. (L10)

146-L. Carbide Flame-Plating in Powder Metallurgy. M. A. Teter. *Metal Powder Association, Proceedings,* v. 1, 1954, p. 68-71; disc., p. 71.

Characteristics and applications. (L23, H general)

147-L. Polyethylene Tape for Pipe Coating. Marshall E. Parker. *Petroleum Engineer (Management Ed.),* v. 27, Jan. 1954, p. D28-D30.

New basis for design of cathodic protection systems. Photographs, diagram, tables. (L26, R10, ST)

148-L. A New Solderable Zinc Alloy Plating Process. Edward B. Saubestre and Edwin R. Bowerman, Jr. *Sylvania Technologist,* v. 8, Jan. 1955, p. 3-6.

Zinc alloy with 10% tin alloy provides an inexpensive, rust-resistant coating. Tables. 4 ref. (L17, K7, Sn, Zn)

149-L. (French.) **Study of the Electrolytic Deposition of Zinc in Dilute and Very Dilute Solutions.** Ch. Haenny and P. Reymond. *Helvetica Chimica Acta,* v. 37, no. 7, Dec. 1954, p. 2067-2083.

Kinetics of electrochemical deposition of zinc for solutions whose concentrations varied from 10^{-3} to 10^{-9} molar, using nickel or lead electrodes. Diagram, graphs. (L17, Zn, Ni, Pb)

150-L. (French.) **Influence of the Rate of Withdrawal on the Thickness of the Zinc Film.** A. Gordet. *Métallurgie et la construction mécanique,* v. 86, no. 11, Nov. 1954, p. 877, 879, 881.

Effects of galvanizing variables. Tables. (L16, Zn)

151-L. (German.) **The Enameling of Aluminum and Its Alloys.** Rudolf Märker. *Silikattechnik,* v. 5, no. 11, Nov. 1954, p. 462-464.

Properties of aluminum, usable aluminum materials, composition of enamel, production of enamel coating, properties and application of enameled pieces. Tables. 34 ref. (L27, Al)

152-L. (German.) **Reactions in the Intermediate Stratum Between Iron and Coating Systems and the Effect of Inhibitors.** A. V. Blom. *Werkstoffe und Korrosion,* v. 5, no. 11, Nov. 1954, p. 425-429; disc., p. 429-430.

Stresses importance of a special surface technology for prolonging life of steel structures and reducing maintenance costs, by close correlation of surface pretreatment and coatings. Tables, diagram. 6 ref. (L general, Fe, ST)

153-L. (Hungarian.) **The Production and Properties of Copper-Coated Aluminum Plate.** Ferenc Köszgi. *Kohaszati Lapok,* v. 9, no. 11, Nov. 1954, p. 520-523.

Review of problems, application of zinc intermediate layer, physical and mechanical properties. Diagrams, tables, micrographs. (L17, P general, Q general, Al, Cu, Zn)

154-L. (Polish.) **Phosphate Treatment of Zinc and Zinc Alloys. II. Anodic Phosphate Treatment of ZnAl Alloys in Alkali Solutions.** J. Kamecki and J. Romanski. *Prace Instytutu Odlewnictwa,* v. 3, no. 3, 1953, p. 92-100.

Effects of bath composition, voltage, time and other variables on quality of phosphate coating. Diagrams, photograph, tables, graphs, micrographs. 23 ref. (L14, Zn, Al)

155-L. (Polish.) **Chromate Treatment fo Zn-Al Alloys.** J. Kamecki and J. Romanski. *Prace Instytutu Odlewnictwa,* v. 4, no. 4, 1954, p. 117-124.

Optimum conditions for good results. Influence of bath composition, time and preparation of metal surface. Tables, graphs, photographs. 43 ref. (L14, Zn, Al)

156-L. (Russian.) **Diffusion Chrome Plating of Steel in a Medium of Chromium Oxide.** G. N. Dubinin. *Vestnik Mashinostroeniia,* v. 34, no. 11, Nov. 1954, p. 56-58.

Experimental data on use of powdered oxides. Tables, micrographs. (L15, Cr, ST)

157-L. Chemical Nickel Coating Boon to Process Equipment. R. W. Glasheen. *Chemical Engineering Progress,* v. 51, Jan. 1955, p. 60-61.

Process shows well on new equipment and in reclaim application; cobalt can also be plated. Photographs, flowsheet. (L14, Co, Ni)

158-L. Temperature Control Key to Longer Pot Life. W. G. Imhoff. *Iron Age,* v. 175, Jan. 20, 1955, p. 92-94.

Zinc attacks iron much faster at temperatures above 900° F. Table, graph, micrographs. (L16, S16, Zn, CN)

159-L. Bronze Plating. Kenneth Rose. *Materials & Methods,* v. 41, Jan. 1955, p. 100-101.

Alloy has excellent bearing properties, maximum solderability and better corrosion resistance. Photographs, table. (L17, K7, R general, Cu, Sn)

160-L. Technical Developments of 1954. Nathaniel Hall. *Metal Finishing,* v. 53, Jan. 1955, p. 58-66.

Critical review of papers published during 1954 on cleaning, pickling, polishing and coating of metals. 285 ref. (L10, L11)

161-L. Plating Wastes—A Review of Research. D. Gardner Foulke and Raymond E. Ledford. *Metal Finishing,* v. 53, Jan. 1955, p. 67-75.

Progress made and studies now underway on control of pollution by metal working wastes. Tables, photograph, graphs, diagram. 63 ref. (L general, A8)

162-L. Rinsing Techniques. Joseph B. Kushner. *Metal Finishing,* v. 53, Jan. 1955, p. 76-79.

Requirements of a good rinse, equipment, wetting agents, special techniques. Diagrams, graph. 8 ref. (L17, L12)

163-L. A Survey of Chromate Treatments. Walter E. Pocock. *Metal Finishing,* v. 53, Jan. 1955, p. 80-83.

Advantages and processing methods for coatings on various metals. Photograph, tables.
(L14, Zn, Cd, CN, Al, Cu)

164-L. Surface Coating Applications of Epoxide Resins. R. N. Wheeler. *Paint Technology,* v. 18, Dec. 1954, p. 131-135.

Show greater number of desirable properties than other coatings. Synergistic effect with other resins. Tables. (L26)

165-L. (German.) **Phosphating and Chromating. New Coatings for Aluminum and Its Alloys.** H. Keller. *Aluminium,* v. 31, no. 1, Jan. 1955, p. 4-7.

Review of electrolytic and chemical processes. Photographs, tables. 2 ref. (L14, Al)

166-L. (German.) **A New Process for Improving the Light-Fastness of Organic Dyes on Anodically Oxidized Aluminum.** C. Th. Speiser. *Aluminium,* v. 31, no. 1, Jan. 1955, p. 8-9.

Special sealing process is applied after dyeing. Table. 3 ref. (L19, Al)

167-L. (German.) **Corrosion Protection of Pure Aluminum, Raffinal, and Some Corrosion Resistant Alloys With Layers of Bohmite.** D. Altenpohl. *Aluminium,* v. 31, no. 1, Jan. 1955, p. 10-14.

Boiling water or steam treatments give coatings with protection value between atmospheric oxidation and anodizing. Graph, table, micrographs. 15 ref. (L14, R3, Al)

168-L. (German.) **Experiences With Nickel Anodes in Electrolytic Baths and Their Uses.** Rudolf Krulla. *Elektrotechnik und Maschinenbau,* v. 71, no. 23, Dec. 1, 1954, p. 560-561.

Factors affecting quality and behavior of nickel anodes. (L17, Ni)

169-L. (German.) **Flame Spraying of Nonmetallic Protective Layers on Metal Surfaces.** Hans Reininger. *Metalloberfläche,* Ausgabe A, v. 9, no. 1, Jan. 1955, p. 6-9.

Review of literature on materials, methods, properties and uses. 36 ref. (L23)

170-L. (Hungarian.) **Micropolishing of Steel and Iron Alloys.** Ferenc Boda and Zoltan Hegedüs. *Kohaszati Lapok,* v. 9, no. 8, Aug. 1954, p. 348-352.

Equipment and operation; composition of electrolytes; methods for various types of steel. Micrographs, photographs, circuit diagram. 11 ref. (L12, L13, ST, Fe)

171-L. (Hungarian.) **Electrochemical Investigation of Corrosion-Inhibitive Phosphate Coatings. I. Study of Cold Phosphating.** Klara Kovacs. *Magyar Kémikusok Lapja,* v. 9, no. 5, May 1954, p. 135-142.

Inhibitive effect, method of application, evaluation, effect of pH, accelerators and concentration of the bath. Graphs, tables. 13 ref. (L14)

172-L. (Russian.) **Investigation of Electrode Processes During Precipitation and Dissolving of Silver in Cyanide Solutions.** A. P. Popkov and A. T. Vagramian. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk,* 1954, no. 6, Nov.-Dec., p. 966-971 + 2 plates.

Apparatus for measuring polarization by alternating and impulse currents. Diagram, circuit diagram, graphs. 8 ref. (L17, Ag)

173-L. (Russian.) **Investigation of Electrolytic Deposition of Lead-Tin-Zinc Alloy.** N. A. Solov'ev. *Zhurnal Prikladnoi Khimii,* v. 27, no. 12, Dec. 1954, p. 1263-1268.

Effect of current density on composition and distribution of deposition; effects of content of hydroborofluoric acid and sizing; corrosion rates of items plated with variations of the alloy. Tables. 2 ref. (L17, R general, Pb, Zn, Sn)

174-L. Electrochemistry of Extremely Dilute Solutions and the Role of Surface Conditions of Electrodes. M. Haissinsky and A. S. Ghosh Mazumdar. *Central Electrochemical Research Institute, Karaikudi, Bulletin,* v. 1, Oct. 1954, p. 5-13.

Mechanisms of electrolytic deposition of metals. Graphs. 4 ref. (L17)

175-L. Studies on Some Operating Variables in Anodizing Process for Reflector Grade Aluminium. A. C. Dutta and B. K. Choudhuri. *Central Electrochemical Research Institute, Karaikudi, Bulletin,* v. 1, Oct. 1954, p. 14-21.

Optimum conditions for producing highly reflective coatings. Graphs, photograph. 10 ref. (L19, Al)

176-L. Chemical Polished Aluminium. R. Pinner. *Electroplating and Metal Finishing,* v. 8, Jan. 1955, p. 4-8.

May replace chromium plate in motor industry because it is cheaper to produce, retains its appearance better on outdoor exposure, does not rust and requires no nickel. Photographs, graphs, tables. 10 ref. (L12, Al)

177-L. The Adhesion of Paints to Metallic Surfaces. C. D. Lawrence. *Electroplating and Metal Finishing,* v. 8, Jan. 1955, p. 14-18.

Tests for underwater paints. Photographs. 5 ref. (L26)

178-L. Peroxygen Compounds Hold Important Place in Treating Metal Surfaces. P. H. Margulies. *Iron Age,* v. 175, Jan. 27, 1955, p. 71-74.

Hydrogen peroxide increases intensity and adherence of black finishes on zinc and cadmium; also useful in combination with ammonium hydroxide for etching, brightening and passivation treatments. Photographs, micrographs, table. (L14, Zn, Cd, Cu, ST, Ni, Pb, Al)

179-L. (Czech.) **Theory of Hot Galvanizing.** Josef Teindl. *Hutnické Listy,* v. 9, no. 12, Dec. 1954, p. 731-737.

Effects of fluxes; structures of coatings; bath additions; protective properties of coatings. Graphs. 23 ref. (L16, Zn, Sn, ST)

180-L. (French.) **Experimental Study and Control of Enamel-Metal Adherence. Application to Steels for Aeronautical Construction and Their Ceramic Protection.** S. J. Tonachella. *Metaux, Corrosion-Industries,* v. 29, no. 351, Nov. 1954, p. 415-430.

Ceramic coatings for gas turbine parts; adherence; preparation of specimens. Diagrams, photographs. (L27, ST)

181-L. (French.) **Descaling of Steel by Means of Oxidizing Pastes.** Jean Frasch. *Metaux, Corrosion-Industries,* v. 29, no. 351, Nov. 1954, p. 438-445.

Chemical, physical and geometrical structure of scale; electrochemical character of chemical descaling. Graph, table. 4 ref. (L12, Fe, ST)

182-L. (German.) **Siliconizing of Steel as Surface Protection. Siliconizing by Means of Volatile Halogen Compounds.** Erich Fitzer. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 11-12, Nov.-Dec. 1954, p. 601-612.

Experimental study on the reaction and control of silicon halide vapors; formation of Fe_3Si films, and heat-resistant Fe_3Si-free ferritic layers by special heat treatment. Graphs, tables, micrographs, diagrams. 27 ref.
(L15, J general, ST, Si)

183-L. (German.) **Depolarization Current and Oxygen Charge of Platinum in Electrolytes Containing Oxygen.** Heribert Grubitsch. Paper from "International Symposium on the Reactivity of Solids, Gothenburg 1952, Proceedings". Ingeniörsvetenskapsakademien and Chalmers Tekniska Högskola. p. 889-896; disc., p. 897.

Effect of resistance on diffusion current; dependence of holding current upon pH value in air-agitated air-saturated buffer solutions. Graphs. 10 ref. (L17, Pt)

184-L. (Russian.) **Influence of Sodium Ions on the Process of the Electrodeposition of Copper.** R. M. Vasenin and S. V. Gorbachev. *Zhurnal Fizicheskoi Khimii,* v. 28, no. 11, Nov. 1954, p. 1922-1927.

Relation of polarization, current density and effective energy of activation to concentration of sodium sulfate. Electroconductivity of solutions. Graphs, table. 6 ref. (L17, P15, Cu)

185-L. (Russian.) **Influence of Rubidium and Cesium Ions on the Process of the Electrodeposition of Copper.** S. V. Gorbachev and R. M. Vasenin. *Zhurnal Fizicheskoi Khimii,* v. 28, no. 11, Nov. 1954, p. 1928-1934.

Polarization, current density and effective activation energy in relation to concentration of cesium and rubidium sulfates. Graphs, table. 5 ref. (L17)

186-L. How the Small Electroplater Can Treat Cyanide Plating Waste Solutions With Hypochlorites. Barnett F. Dodge and Walter Zabban. *Plating,* v. 42, Jan. 1955, p. 71-75.

Abatement of stream pollution. Diagrams, table. 7 ref. (L17, A8)

187-L. (Book—German.) **Surface Treatment of Ferrous and Nonferrous Metals.** Willi Machu. 801 p. 1954. Akademische Verlagsgesellschaft, Geest & Portig K.-G., Leipzig, Germany.

Covers degreasing, cleaning, pickling, burnishing, polishing, and grinding. (L general)

M

Metallography, Constitution and Primary Structures

48-M. (English.) **Note on the Disorientation and Impurity Substructures in Zinc Single Crystals.** K. F. Hulme. *Acta Metallurgica,* v. 2, no. 6, Nov. 1954, p. 810-815.

The Berg-Barrett technique was used to show that disorientation

boundaries and impurity-rich regions sometimes coincide. Micrographs. 12 ref. (M26, Zn)

49-M. (English.) **The Structure of the $Co_3W_9C_4$ Phase.** N. Schönberg. *Acta Metallurgica,* v. 2, no. 6, Nov. 1954, p. 837-840.

X-ray data on unit cell size and positions of the various atoms in the hexagonal cell. Tables. 8 ref. (M26, Co, W, C)

50-M. (English.) **The Influence of Aluminum on the Occupation of Lattice Sites in the TiAl Phase.** R. P. Elliott and W. Rostoker. *Acta Metallurgica,* v. 2, no. 6, Nov. 1954, p. 884-885.

Refraction data show that aluminum atoms replace titanium atoms on some sites but otherwise preserve long range order. Graphs, table. 6 ref. (M25, Ti, Al)

51-M. (English.) **Diffraction Studies of Possible Ordering in Alpha-Brass.** D. T. Keating. *Acta Metallurgica,* v. 2, no. 6, Nov. 1954, p. 885-887.

No ordering detected by either X-ray or neutron diffraction. Graphs. 4 ref. (M22, N10, Cu, Zn)

52-M. (English.) **Equilibrium Segregation of Silicon at Grain Boundaries in Nickel-Iron-Copper-Molybdenum Alloys.** R. E. S. Walters. *Acta Metallurgica,* v. 2, no. 6, Nov. 1954, p. 890, 891, 893.

Equilibrium concentration of silicon appears to be higher at grain boundaries than in the crystals at temperatures below 800° C. Micrograph. 1 ref. (M27, Ni, Fe, Cu, Mo)

53-M. Wet-Process Autoradiography Modified for Studying Metals. George C. Towe, Henry J. Gomberg, and J. W. Freeman. *Nucleonics,* v. 13, Jan. 1955, p. 54-58.

Includes graph, micrographs. 2 ref. (M23)

54-M. Properties of Metallic Phases as a Function of Number and Kind of Bonding Electrons. Niels Engel. *Powder Metallurgy Bulletin,* v. 7, Dec. 1954, p.8-18.

Theory of metallic bonding with special reference to cermets. Graphs, table. 9 ref. (M25, H11)

55-M. The Preparation of Titanium Carbide Specimens for Microscopic Study. Ronald Silverman and Patricia D. Luscz. *Powder Metallurgy Bulletin,* v. 7, Dec. 1954, p. 25-28.

Technique for unbound specimens. Micrographs. 3 ref. (M21, C-n)

56-M. (Russian.) **Etching Steel by Ionic Bombardment.** I. N. Prilezhaeva, G. V. Spivak and M. I. Malkina. *Zhurnal Tekhnicheskoi Fiziki,* v. 24, no. 11, Nov. 1954, p. 2090-2096.

Applicability of ionic etching to various types of steel, including high strength and heat resistant steels. Effects of varying voltage, current density, etc. Micrographs. 9 ref. (M21, AY, SS)

57-M. Physical Chemistry of Steel. IV. The Problem of Structure. J. A. Kitchener. *Iron & Steel,* v. 28, Jan. 1955, p. 3-7.

Problems in the structure of liquid steel. Diagrams, graph, tables. 15 ref. (M26, P12, ST)

58-M. Non-Metallic Inclusions. IV. Microscopical Examination of Inclusions. H. B. Bell. *Iron & Steel,* v. 28, Jan. 1955, p. 8-10.

Techniques for identifying inclusions in various metals. 33 ref. (M27, M28)

59-M. The Size of Interstitial Solute Atoms in Close-Packed Metals. Kenneth A. Moon. *Journal of Physical Chemistry,* v. 59, Jan. 1955, p. 71-76.

Develops better method of calculation from X-ray lattice data. Tables, graphs. 22 ref. (M26)

60-M. Preparation of Specimens for the Electron Diffraction Camera. P. R. Rowland. *Vacuum,* v. 3, Apr. 1953, p. 133-150.

Preparation of specimens for the transmission and reflection methods, reactions carried out in the camera, precautions. Diagrams, diffraction patterns, micrographs, tables. 31 ref. (M22)

61-M. (Russian.) **Certain Peculiarities of Internal Structure of Silicon Carbide Crystals and the Spiral Microrelief of Their Faces.** N. V. Gliki. *Doklady Akademii Nauk SSSR,* v. 99, no. 2, Nov. 11, 1954, p. 255-258 + 1 plate.

X-ray diffraction and electron-microscope investigation. Micrographs. 7 ref. (M26)

62-M. (Russian.) **Distortion of the Crystal Lattice in Solid Solutions of Cobalt and Palladium in Iron.** V. I. Iveronova and A. A. Katsnel'son. *Doklady Akademii Nauk SSSR,* v. 99, no. 3, Nov. 21, 1954, p. 391-394.

Determination of mean values of static displacement in iron-palladium alloys and iron-cobalt alloys. Tables, diagrams. 7 ref. (M26, Fe, Pd, Co, Ni, Cu, Zn, Al)

63-M. (Russian.) **Problem of the Structure of Oxide Films on Molten Aluminum and Its Alloys.** M. V. Mal'tsev, Iu. D. Chistiakov and M. I. Tsypin. *Doklady Akademii Nauk SSSR,* v. 99, no. 5, Dec. 11, 1954, p. 813-814 + 1 plate.

Films formed at various temperatures on binary Al-Mg, Al-Cu, Al-Zn, and Al-Fe, and more complex industrial alloys. Electron-diffraction patterns. 5 ref. (M26, Al, Mg, Cu, Zn, Fe)

64-M. Titanium-Lead System. Paul Farrar and Harold Margolin. *Journal of Metals,* v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 101-104.

Studies on the region 0 to 58% lead from 500° C. to liquidus temperatures. Three reactions were found. Tables, graph, micrographs. 6 ref. (M24, Ti, Pb)

65-M. Selected Isothermal Sections in the Titanium-Rich Corners of the Systems Ti-Fe-O, Ti-Cr-O, and Ti-Ni-O. W. Rostoker. *Journal of Metals,* v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 113-116.

Shape and disposition of the ternary intermediate-phase fields for compounds isomorphous with Fe_3W_3-C. Graphs, micrographs. 8 ref. (M24, Ti, Fe, Cr, Ni)

66-M. Chromium-Rich Portion of the Chromium-Nickel Phase Diagram. Charles Stein and Nicholas J. Grant. *Journal of Metals,* v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 127-134.

Study confirms existence of a eutectoid reaction at 1215° C. and a eutectic reaction at 1343° C. Graphs, tables, micrographs. 15 ref. (M24, Cr, Ni)

67-M. (English.) **Investigations on the Double Carbides in the Cobalt-Tungsten-Carbon System.** Roland Kiessling. Paper from "International Symposium on the Reactivity of Solids, Gothenburg 1952, Proceedings". Ingeniörsvetenskapsakademien and Chalmers Tekniska Högskola. p. 1065-1068.

Preliminary report on existence of two double carbides in the system. Refractograms, tables. 5 ref. (M24, H general, Co, W)

68-M. (Czech.) **Study of Structures of Isothermal Decomposition of Supercooled Austenite With the Electron Microscope.** Ladislav Bezdek and Dalibor Ruzicka. *Hutnické Listy,* v. 9, no. 12, Dec. 1954, p. 719-727.

Study at magnifications up to 20,000 X of a carbon toolsteel. Table, graphs, micrographs. 4 ref. (M27, N8, TS)

69-M. (French.) **High-Temperature Furnace for the Electron Microscope.** N. Takahashi, K. Itoh, T. Itoh, M. Watanabe, K. Mihama and T. Takeyama. *Metaux, Corrosion-Industries,* v. 29, no. 351, Nov. 1954, p. 431-437.

Apparatus for high-temperature microscopy. Diagrams, micrographs, photograph. 4 ref. (M21)

70-M. (German.) **The Question of the Appearance of Ti_2Fe.** Wolfgang Gruhl and Dieter Ammann. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 11-12, Nov.-Dec. 1954, p. 599-600.

X-ray investigations of iron-titanium crystals and identification of intermetallic compound Ti_2Fe. Photograph, refractogram, table. 10 ref. (M26, Ti, Fe)

71-M. (German.) **Application of Zephirol Etching in the Investigation of Temper Brittleness, Aging Brittleness, and Stress-Corrosion of Steels.** Hans-Kurt Görlich, Egon Koerfer, Günter Obelode and Hermann Schenck. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 11-12, Nov.-Dec. 1954, p. 613-617; disc., p. 617-619.

Study of the suitability of zephirol, nitric acid, and picric acid as selective etchants. Micrographs, tables. 15 ref. (M21, Q23, R1, AY)

72-M. (German.) **A Process for Thermoplastic Target Preparation.** Friedrich Leonhard. *Mikroskopie,* v. 62, no. 2, Dec. 1954, p. 129-137.

Improved devices and methods for replica method of investigating metals by electron microscopy. Diagram, photographs, micrographs. 9 ref. (M21)

73-M. (German.) **Ternary Systems With Two Rare Earth Metals. Example of Silver-Cerium-Lanthanum.** Rudolf Vogel and Helmut Klose. *Zeitschrift für Metallkunde,* v. 45, no. 12, Dec. 1954, p. 670-673.

Thermal and metallographic determination of the constitution diagram, phases, and intermetallic compounds. Graphs, photograph, micrographs. 3 ref. (M24, Ag, Ce, La)

74-M. (German.) **Defects in the Crystal Structure of Zinc and Cadmium Monocrystals.** Sigmar German. *Zeitscrift für Metallkunde,* v. 45, no. 12, Dec. 1954, p. 674-676.

Metallographic, X-ray and interference studies. Micrographs, diagrams. 6 ref. (M26, Zn, Cd)

75-M. (German.) **Investigation of the Chromium-Zinc System by the Amalgam Process.** Franz Lihl and Peter Jenitschek. *Zeitschrift für Metallkunde,* v. 45, no. 12, Dec. 1954, p. 686-689.

X-ray study of specimens prepared by electrolytic deposition of chromium on a molten zinc-amalgam electrode. Table, diagram. 11 ref. (M24, L17, Cr, Zn, Hg)

76-M. (German.) **Equilibrium Diagram and Reactions in the Solid State.** G. Masing. Paper from "International Symposium on the Reactivity of Solids. Gothenburg 1952, Proceedings". Ingeniörsvetenskapsakademien and Chalmers Tekniska Högskola. p. 941-947; disc., p. 947-948.

Data for iron-nickel, iron-molybdenum and gold-nickel alloys disproves assumption that boundary concentration of the participating phases corresponds to the heterogeneous equilibrium. Graphs, diagram, table. 6 ref. (M24, Fe, Ni, Mo, Au)

77-M. (Russian.) **Dislocation Theories of Strength and Plasticity.** A. V.

Stepanov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* 1954, no. 9, Sept., p. 90-107.

Critical analysis; local fractures in anisotropic, nonhomogeneously periodic media. Diagrams. 14 ref. (M26, Q23)

78-M. (Book.) **Concerning the Nature of Things.** William Bragg. 231 p. 1954. Dover Publications, 1780 Broadway, New York 19, N. Y. $1.25 paper, $2.75 cloth.

Series of lectures covering the atomic structures of gases, liquids, and crystals of diamonds, ice and snow, and metals. (M25)

N

Transformations and Resulting Structures

69-N. (French.) **Experimental Research on the Microstructure of the Polycrystalline Solid Solution Copper-Zinc 65/35 Very Slightly Deformed in Tension, and Its Evolution During Annealing Between 200 and 600° C. II. A Study of the Annealing Microstructure.** P. A. Jacquet. *Acta Metallurgica,* v. 2, no. 6, Nov. 1954, p. 752-796.

Simple, but highly sensitive and accurate technique of etching alpha copper-zinc alloy permitted study of glide inside grains and evolution of microstructure up to the end of polygonization. Photograph, micrographs, refractograms. 35 ref. (M27, N5, J23, Q24, Cu, Zn)

70-N. (English.) **Relaxation Effects in Solid Solutions Arising From Changes in Local Order. II. Theory of the Relaxation Strength.** A. D. LeClaire and W. M. Lomer. *Acta Metallurgica,* v. 2, no. 6, Nov. 1954, p. 731-742.

Calculated and measured values of relaxation strength agree for alpha copper-zinc, alpha silver-zinc and copper-aluminum alloys. Tables, graph. 20 ref. (N10, Q3, Cu, Zn, Ag, Al)

71-N. (English.) **A Relaxed Vacancy Model for Diffusion in Crystalline Metals.** N. H. Nachtrieb and G. S. Handler. *Acta Metallurgica,* v. 2, no. 6, Nov. 1954, p. 797-802.

Mechanism for diffusion in solid metals proposed in which rate-limiting atom movements occur within small regions of disorder in the crystal. Disordered regions average 12 to 14 atoms which have relaxed inward around a lattice vacancy, and have an energy content about the same as the equivalent number of atoms in the liquid state. Tables, graphs. 6 ref. (N1)

72-N. (English.) **Thermal Diffusion in Solid Alloys.** L. S. Darken and R. A. Oriani. *Acta Metallurgica,* v. 2, no. 6, Nov. 1954, p. 841-847.

Vacancy mechanism to explain migration of interstitial solutes to higher temperature regions of alpha iron-nitrogen, alpha iron-carbon and copper-gold alloys. Diagrams, graphs, tables. 16 ref. (N1, Fe, Cu, Au)

73-N. (English.) **Electron-Optical Observations of Transformations in Eutectoid Steel.** G. W. Rathenau and G. Baas. *Acta Metallurgica,* v. 2, no. 6, Nov. 1954, p. 875-883.

Transformation of austenite into pearlite and vice versa studied on pure eutectoid steel by direct observation, applying electron-emission microscopy. Pearlite colonies generally cross austenite grain boundaries. Strain-induced grain-boundary migration occurs within the austenite. Stimulation of austenitic twins was observed on austenitizing partially transformed austenite. Diagrams, micrographs. 10 ref. (N8, CN)

74-N. (English.) **The Superlattice in Sendust.** R. I. Garrod and L. M. Hogan. *Acta Metallurgica,* v. 2, no. 6, Nov. 1954, p. 887-888.

X-ray studies show that iron alloys containing 8 to 11% silicon and 4.5 to 8% aluminum retain a superlattice of the Fe_3Al type after a wide variety of heat treatments. Table. 5 ref. (N10, J general, SG-n, Fe, Al, Si)

75-N. Diffusion of Cobalt in Molybdenum. E. S. Byron and V. E. Lambert. *Electrochemical Society, Journal,* v. 102, Jan. 1955, p. 38-41.

Coefficients determined in order to estimate minimum sintering times for complete homogenization for powder metallurgy applications. Tables, graphs, micrographs. 6 ref. (N1, H15, Co, Mo)

76-N. Topochemical Reactions on Electrodeposits. Artur Kutzelnigg. *Electroplating and Metal Finishing,* v. 7, Dec. 1954, p. 454-457.

Reactions in which the deposit is converted into an insoluble adherent reaction product, and those in which the deposit is dissolved leaving a nonmetallic film exhibiting original structure. Micrographs, diagrams, graphs. 9 ref. (N12, Cr, Ni, Ag)

77-N. Some Recent Work in Physical Metallurgy in Sweden. Erik Rudberg. *Metal Progress,* v. 67, Jan. 1955, p. 104-107.

Incompleted reactions in solid alloys—metastability—are under intense study, including bainitic hardening of alloy steels, martensitic hardening of 18-8 stainless, and earliest stages of precipitation hardening in nonferrous alloys. Photograph, micrographs. (N8, N7)

78-N. A Method of Controlling Quenching in Baths. (Digest of "Factors Influencing the Isothermal Transformation of Austenite in the Intermediate Range (Bainite Range). II.", by Otto Schaaber; *Draht (English Ed.),* 1954, Apr., p. 29-39.) *Metal Progress,* v. 67, Jan. 1955, p. 182 + 5 pages.

Shows that mechanical properties of bainite are impaired by presence of propearlitic ferrite; difficulty of preventing bainite transformation during martempering. (N8, J26, ST)

79-N. (German.) **Precipitation in Plastically Deformed Solid Solutions.** Hermann Schumann. *Metallurgie und Giessereitechnik,* v. 4, no. 11, Nov. 1954, p. 474-484.

Differences between precipitations from supersaturated nondeformed and deformed solid solution alloys. Theoretical considerations. Diagrams, graphs, tables, micrographs. 28 ref. (N7)

80-N. (Polish.) **Coagulation of Eutectoidal Cementite in Pearlitic Malleable Cast Iron.** J. Raczka. *Prace Instytutu Odlewnictwa,* v. 3, no. 1, 1953, p. 28-40.

Effects of silicon and manganese contents, rate of cooling, temperature and soaking time. Tables, graphs, micrographs. 6 ref. (N8, CI)

81-N. (Russian.) **Method of Investigation of Phase Transformation in Non-Metallic Compounds (Ferrites), and in Metal Alloys.** M. V. Dekhtiar, L. M. Dekhtiar and T. A. Iurina. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 18, no. 4, July-Aug. 1954, p. 502-510.

Instrumentation and procedure based on principle of electrical resistance and magnetic permeability. Graphs, diagrams. 11 ref. (N6, M23, Fe, W, Ni, Zn, Al, ST, AY)

82-N. (Russian.) **Temperature Conditions of Phase Transformations During Induction Heating of Steel.** I. N. Kidin and M. G. Kogan. *Zhurnal Tekhnicheskoi Fiziki,* v. 24, no. 11, Nov. 1954, p. 2011-2024.

Theoretical analysis of the kinetics of the process and the effect of pearlite-austenite phase transformations on such heating. Graphs, oscillogram. 16 ref. (N8, J2, SS)

83-N. Equilibrium Between Titanium in Liquid Iron and Titanium Oxides. R. L. Hadley and G. Derge. *Journal of Metals,* v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 55-60.

Study of iron-titanium alloys up to 50% titanium shows first a decrease then a rapid increase of oxygen solubility with increasing titanium. Graphs, tables, micrographs, diagram. 16 ref. (N12, P12, Ti, Fe)

84-N. Sulphur Pressure Measurements of Molybdenum Sesquisulphide in Equilibrium With Molybdenum. C. Law McCabe. *Journal of Metals,* v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 61-63.

Molybdenum sesquisulfide is in equilibrium with molten molybdenum at 1100° C. Tables, refractograms, graph. 6 ref. (N12, P12, Mo)

85-N. Martensite Formation in Powders and Lump Specimens of Ti-Fe Alloys. D. H. Polonis and J. Gordon Parr. *Journal of Metals,* v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 64.

Further tests confirm differences in structure and hardness and explain them on basis of size effects. Graph, micrographs. 4 ref. (N9, Q29, Ti, Fe)

86-N. Low Pressure Hydrogen Solubility in Uranium. H. C. Mattraw. *Journal of Physical Chemistry,* v. 59, Jan. 1955, p. 93-94.

Work done at 295° C. Table. 3 ref. (N12, U)

87-N. Exaggerated Grain Growth in Extrusions. D. H. Locke. *Metallurgia,* v. 50, no. 302, Dec. 1954, p. 268-275.

Excessively large grains are caused by a combination of complex flow and subsequent heat treatment. Possibilities of control and need of further study. Photographs, diagrams. 48 ref. (N3, F24, Al, Cu, Sn)

88-N. (Czech.) **Solution of Graphite in Austenite.** Robert Kamensky. *Slévarenstvi,* v. 2, no. 12, Dec. 1954, p. 356-358.

Solution rate is dependent on rate of filling cavities resulting from the solution of the graphite; mechanism of the filling process. Micrograph, table, graph. 7 ref. (N8, ST)

89-N. (German.) **The Carbides of Columbium.** G. Brauer, H. Renner and J. Wernet. *Zeitschrift für anorganische und allgemeine Chemie,* v. 277, no. 5, Dec. 1954, p. 249-257.

Preparation and X-ray studies; solubility of carbon in metallic columbium. Tables, diagram, powder diagram, graphs. 7 ref. (N12, H general, Cb, C)

90-N. (Russian.) **Influence of Manganese on the Self-Diffusion of Iron.** P. L. Gruzin, B. M. Noskov and V.

I. Shirokov. *Doklady Akademii Nauk SSSR,* v. 99, no. 2, Nov. 11, 1954, p. 247-250.

Temperature dependence of the coefficient of self-diffusion of iron in gamma-phase of iron-manganese alloys. Diagrams, tables. 7 ref. (N1, Fe, Mn)

91-N. (Russian.) **Particular Solution of a Problem for the Diffusion Boundary Layer in the Diffusor.** V. P. Shestopalov. *Prikladnaia Matematika i Mekhanika,* v. 18, no. 6, Nov.-Dec. 1954, p. 753-756.

Mathematical treatment. 5 ref. (N1)

92-N. Structure and Properties of Ti-C Alloys. H. R. Ogden, R. I. Jaffee and F. C. Holden. *Journal of Metals,* v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 73-80.

Heat treatments and resulting mechanical properties of titanium-carbon and titanium-carbon-oxygen alloys. Graphs, tables, micrographs. 5 ref. (M general, J general, Q general, Ti)

93-N. Solution Rate of Solid Aluminum in Molten Al-Si Alloy. C. M. Craighead, E. W. Cawthorne and R. I. Jaffee. *Journal of Metals,* v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 81-87.

Static tests with 2S aluminum at 585, 595, 600, 610 and 625° C. in baths containing 10.5, 11.8, 12.5, and 14% silicon show linear relation between time of immersion and depth of penetration at a given temperature. Solution rate increases with temperature. Graphs, tables, diagram, photograph, micrographs. 2 ref. (N12, Al, Si)

94-N. Mobilities in Diffusion in Alpha Brass. G. T. Horne and R. F. Mehl. *Journal of Metals,* v 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 88-99.

Diffusion coefficients, mobilities and Kirkendall effect at various concentrations of the alpha-phase. Tables, diagram, graphs. 20 ref. (N1, Cu, Zn)

95-N. Effect of Alpha Solutes on the Heat-Treatment Response of Ti-Mn Alloys. H. R. Ogden, F. C. Holden and R. I. Jaffee. *Journal of Metals,* v 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 105-112.

Substitutional additions, such as aluminum, decrease rate of nucleation and growth of alpha from beta but interstitials such as carbon and nitrogen increase the rate. Tables, graphs, micrographs. 7 ref. (N2, J general, Ti)

96-N. Autoradiography Determination of the Self-Diffusion of Silver. Helmut Krueger and Herbert N. Hersh. *Journal of Metals,* v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 125-126.

This method gave results in satisfactory agreement with previous data. Table, graph. 7 ref. (N1, Ag)

97-N. Solubility and Decomposition Pressures of Hydrogen in Alpha-Zirconium. Earl A. Gulbransen and Kenneth F. Andrew. *Journal of Metals,* v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 136-144.

Thermodynamic quantities determined by measurement of decomposition pressures over a broad range of composition and temperature. Graphs, tables. 17 ref. (N12, P12, Zr)

98-N. Effects of Tensile Stress on the Austenite to Ferrite Transformation in Eutectoid Steel. L. S. Birks and E. F. Bailey. *Journal of Metals,* v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 179-182.

X-ray diffraction study shows tensile stress accelerates equilibrium conditions and may cause precipitation of large carbides. Photograph, micrographs, graphs. 3 ref. (N8, Q23, CN)

99-N. Some Characteristics of the Isothermal Martensitic Transformation. C. H. Shih, B. L. Averbach and Morris Cohen. *Journal of Metals,* v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 183-187.

Studies on transformation rates and mechanisms in iron-nickel-manganese and iron-manganese-carbon alloys. Tables, graphs, micrograph. 10 ref. (N8, Fe, Mn, Ni)

100-N. Study of the Effect of Boron on the Decomposition of Austenite. C. R. Simcoe, A. R. Elsea and G. K. Manning. *Journal of Metals,* v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 193-200.

Concentration of boron at lattice imperfections accounts for its hardenability effects in steels. Tables, graphs, micrographs. 15 ref. (N8, J26, AY)

101-N. Dispersion Hardening of Copper-Chromium Alloys. W. R. Hibbard, Jr., and E. W. Hart. *Journal of Metals,* v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 200-202.

Effects of amount and characteristics of chromium-rich precipitate on flow characteristics. Tables, micrographs, graphs. 13 ref. (N7, Q24, Cu, Cr)

102-N. Isothermal Austenite Grain Growth. H. B. Probst and M. J. Sinnott. *Journal of Metals,* v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 215-216.

Effects of temperature, time at temperature and prior grain size on behavior of vacuum-melted electrolytic iron. Graphs, table. 11 ref. (N8, Fe)

103-N. (English.) **On the Theory of Transformation Stress.** Kotaro Honda and Mizuho Sato. Paper from "International Symposium on the Reactivity of Solids, Gothenburg 1952, Proceedings". Ingeniörsvetenskapsakademien and Chalmers Tekniska Högskola. p. 847-857; disc., p. 857.

Theory explains irreversibility, such as the hysteresis loop, in the A_3 transformation of pure iron. Graphs. (N6, Q25)

104-N. (English.) **Reactivity of Crystal Interfaces.** B. Chalmers. Paper from "International Symposium on the Reactivity of Solids, Gothenburg 1952, Proceedings". Ingeniörsvetenskapsakademien and Chalmers Tekniska Högskola. p. 863-865; disc., p. 865-866.

Free energy conditions between crystals of different phases, solid-liquid interfaces and crystals of the same phase but of different orientation; relation to precipitation reactions and intergranular corrosion. 12 ref. (N7, P12, R2)

105-N. (French.) **Effect of Gas Adsorption on the Cessation of Unbalanced Stages by Annealing of Tempered Alloys.** Hubert Forestier and Joseph Maurer. Paper from "International Symposium on the Reactivity of Solids, Gothenburg 1952, Proceedings". Ingeniörsvetenskapsakademien and Chalmers Tekniska Högskola. p. 881-887; disc., p. 887.

Investigation of the surface transformation of a martensite structure in 0.8% carbon steel, and the surface hardening of beryllium bronze. Graphs. 6 ref. (N8, J23, CN, Cu)

106-N. (French.) **The Effect of Substitutions on the Properties of Cementite.** A. Michel. Paper from "International Symposium on the Reactivity of Solids, Gothenburg 1952, Proceedings". Ingeniörsvetenskapsakademien and Chalmers Tekniska Högskola. p. 929-940; disc., p. 940.

Investigation on production, thermomagnetic cycle and thermal evolution of pure cementite; effects of nickel, cobalt, sulfur and nitrogen additions. Graphs. 15 ref. (N8, ST)

107-N. (German.) **Effect of Alternating Stresses on Diffusion and Segregation Processes in Unalloyed Steels.** Hermann Schenck and Eugen Schmidtmann. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 11-12, Nov.-Dec. 1954, p. 579-588.

Carburizing, nitriting and chromizing tests accompanied by pulsating stresses or ultrasonic frequencies show that both increase the diffusion of carbon, nitrogen, and chromium; alternating stresses accelerate age hardening. Photograph, graphs, micrographs. 2 ref. (N1, N7, CN)

108-N. (German.) **Electron Microscopic Investigations of the Crystal Growth of Oxides.** G. Pfefferkorn. *Mikroskopie,* v. 62, no. 2, Dec. 1954, p. 109-115.

Confirms theory of crystal growth through surface diffusion; provides an insight on mechanism of growth and surface structure of oxide coatings. Micrographs. (N1, M26, Ni, Cu, Mo, Fe, Zn)

109-N. (German.) **The Reaction of Iron With Liquid Aluminum.** Erich Gebhardt and Werner Köster. Paper from "International Symposium on the Reactivity of Solids, Gothenburg 1952, Proceedings". Ingeniörsvetenskapsakademien and Chalmers Tekniska Högskola. p. 921-928; disc., p. 928.

Effects of various amounts of zinc on iron-aluminum reactions. Micrographs, photographs, graphs. (N12, Fe, Al)

110-N. (German.) **Self-Diffusion, Plasticity and Transformation in Brass With 58% Copper.** Günter Wassermann. Paper from "International Symposium on the Reactivity of Solids, Gothenburg 1952, Proceedings". Ingeniörsvetenskapsakademien and Chalmers Tekniska Högskola. p. 957-962.

Investigation on 1-mm. drawn wires, dipped into liquid air and repeatedly brought into room temperature. Partial interpretation of results. Graphs, diagrams. 7 ref. (N1, Q23, Cu, Zn)

111-N. (German.) **Processes of Sintering and Diffusion in the System Nickel-Molybdenum-Iron.** F. Benesovsky. Paper from "International Symposium on the Reactivity of Solids, Gothenburg 1952, Proceedings". Ingeniörsvetenskapsakademien and Chalmers Tekniska Högskola. p. 963-978.

Interpretation of the sintering process in the nickel-molybdenum-iron system on the basis of model experiments. Determination of technical properties and structures. Graphs, micrographs. 25 ref. (N1, H15, Ni, Mo, Fe)

112-N. (German.) **Solid Solution Formation in High-Melting-Point Hard Materials (Cermets).** R. Kieffer. Paper from "International Symposium on the Reactivity of Solids, Gothenburg 1952, Proceedings". Ingeniörsvetenskapsakademien and Chalmers Tekniska Högskola. p. 1001-1026; disc., p. 1026.

Diffusion processes during sintering; type and purpose of the formation of solid solutions; properties; production. Nitride-carbide, boride-boride, and silicide solid solutions. Tables, graphs, diagrams, micrographs. 38 ref. (N12, H15)

113-N. (Russian.) **Transformation of Residual Austenite in R9 Steel During Rapid Heating.** G. F. Golovin and E. P. Mogilevskii. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* 1954, no. 8, Aug., p. 119-122.

Effect of temperature and rate of induction heating on hardness and amounts of residual austenite in tempering process. Micrographs, graph. 2 ref. (N8, J2, TS)

114-N. (Russian.) **Determination of the Correlation Between Mobility and the Coefficient of Diffusion for the Photovacancies in Electronic Germanium.** S. M. Ryvkin. *Zhurnal Tekhnicheskoi Fiziki,* v. 24, no. 12, Dec. 1954, p. 2136-2149.

Diffusion drift and concentration distribution of "nonequilibrium", "nonbasic" current carriers for a partly illuminated semiconductor. Graphs, table, diagrams. 9 ref. (N1, Ge)

115-N. (Russian.) **Effect of Induction Heating on the Structural Transformations of High-Chromium Toolsteel.** E. P. Mogilevskii. *Zhurnal Tekhnicheskoi Fiziki,* v. 24, no. 12, Dec. 1954, p. 2202-2208.

Effects of temperature and rate of heating on hardness and amount of residual austenite. Tables, graphs. 1 ref. (N8, J2, TS, Cr)

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Physical Properties and Test Methods

58-P. Viscosity of the Sodium-Potassium System. C. T. Ewing, J. A. Grand and R. R. Miller. *Journal of Physical Chemistry,* v. 58, Dec. 1954, p. 1086-1088.

Studies extended to 700° C. Tables. 5 ref. (P10, Na, K)

59-P. A Direct Reading Instrument for the Measurement of Small Displacements. W. D. Corner and G. H. Hunt. *Journal of Scientific Instruments,* v. 31, Dec. 1954, p. 445-447.

Principle and operation of apparatus for measuring magnetostriction of small crystals of nickel with an accuracy of 1% and displacements to 10^{-7} cm. Diagram, graph, circuit diagram. 2 ref. (P16, Ni)

60-P. Method of Determining Temperature Coefficient of Electronic Core Material. R. H. Rodrian. *Metal Powder Association, Proceedings,* v. 2, 1954, p. 78-82; disc., p. 82-83.

Techniques for determining thermal stability of high-frequency components. Circuit diagrams. (P12, H11, Fe)

61-P. Resistivity and Hall Effect of Germanium at Low Temperatures. C. S. Hung and J. R. Gliessman. *Physical Review,* v. 96, ser. 2, Dec. 1, 1954, p. 1226-1236.

Investigates activation of impurity states, behavior of the degenerate electron gas and theory of scattering. Diagrams, graphs, tables. 20 ref. (P15, Ge)

62-P. The Electrical and Thermal Conductivities of Monovalent Metals. J. M. Ziman. *Royal Society, Proceedings,* v. 226, ser. A, Dec. 7, 1954, p. 436-454.

Recalculation of conductivities at all temperatures, with objections to and modifications of the Bloch theory. Treatment of electron scattering by thermal lattice vibrations. Graphs, diagram, table. 25 ref. (P15, P12)

63-P. Thermal Conductivity of Metals and Alloys at Low Temperatures. Robert L. Powell and William A. Blanpied. *U. S. National Bureau of Standards Circular* 556, Sept. 1954, 68 p.

Compilation and review of existing data covering nearly all metals. Tables, graphs. Approx. 200 ref. **(P12)**

64-P. (English.) **The Resistivity-Temperature-Concentration Relationships in the System Niobium-Titanium.** S. L. Ames and A. D. McQuillan. *Acta Metallurgica,* v. 2, no. 6, Nov. 1954, p. 831-836.

Additions of titanium cause progressive increase in resistivity and a decrease in temperature coefficient of resistance. Graphs, diagram, micrograph. 8 ref. (P15, Cb, Ti)

65-P. (French.) **Electrical Resistance of Castings.** *Fonderie,* 1954, no. 106, Nov., p. 4241-4246.

Different factors influencing electrical resistance of cast iron. Tables, graph. 8 ref. **(P15, CI)**

66-P. (German.) **The Melting Point of Indium.** S. Valentiner. *Zeitschrift für anorganische und allgemeine Chemie,* v. 277, nos. 3-4, Nov. 1954, p. 201-204.

Determination by platinum resistance thermometer and its application to the calibration of thermoelements. Table. 9 ref. (P12, In)

67-P (German.) **The Theory of Electrical Resistance of Good Metallic Conductors.** Claus-Adolf Busse and Fritz Sauter. *Zeitschrift für Physik,* v. 139, no. 4, 1954, p. 440-447.

Proposes a relationship between electrical resistance and other physical characteristics of alkali metals by treating the vibrating ion lattices as elastic ion continuums. Tables. 4 ref. (P15, EG-e)

68-P. Determination of the Vapor Pressure of Sodium. M. M. Makansi, C. H. Muendel and W. A. Selke. *Journal of Physical Chemistry,* v. 59, Jan. 1955, p. 40-42.

Data for range 0.047 to 6.489 atmospheres. Tables, graph. 6 ref. **(P12, Na)**

69-P. Theory of Donor and Acceptor States in Silicon and Germanium. C. Kittel and A. H. Mitchell. *Physical Review,* v. 96, ser. 2, Dec. 15, 1954, p. 1488-1493.

Evaluation of Wannier equation. Includes degenerate bands. Shows fair agreement with experiment. Graph. 10 ref. (P15, Si, Ge)

70-P. Transverse Hall and Magnetoresistance Effects in *p*-Type Germanium. R. K. Willardson, T. C. Harman and A. C. Beer. *Physical Review,* v. 96, ser. 2, Dec. 15, 1954, p. 1512-1518.

Modification of the two-band model to include existence of a small number of high-mobility holes gives closer agreement with experiments. Graphs, table. 25 ref. (P15, P16, Ge)

71-P. Electrical and Optical Properties of Indium Selenide. R. W. Damon and R. W. Redington. *Physical Review,* v. 96, ser. 2, Dec. 15, 1954, p. 1498-1500.

Photoconductive response was mostly in the visible; sensitivity is comparable with that of gray selenium. Graphs. 5 ref. (P15, P17, In, Se)

72-P. (Polish.) **Change of Free Energy in Oxidation Reactions of Common Materials Important in Steelmaking.** Jan Bochenek and Eugeniusz Ptak. *Archiwum Gornictwa i Hutnictwa,* v. 2, no. 1, 1954, p. 57-69.

Values for aluminum, calcium, chromium, magnesium and nickel from 1700 to 2000° K. Tables. 4 ref. (P12, D general, Al, Ca, Cr, Mg, Ni)

73-P. (Polish.) **Coefficients of Activity of Some Non-Ferrous Metals in Binary Solid and Liquid Solutions.** Wladyslaw Ptak. *Archiwum Gornictwa i Hutnictwa,* v. 2, no. 1, 1954, p. 71-122.

Calculations based on methods given by A. Krupkowski for nickel-carbon, tin-lead, copper-silver, copper-nickel, bismuth-mercury, tin-zinc, bismuth-copper, cadmium-zinc, bismuth-cadmium and bismuth-tin alloys. Tables, graphs. 37 ref. (P12, Ni, Sn, Pb, Cu, Ag, Bi, Hg, Zn, Cd)

74-P. (Russian.) **Equation of Thermoconductivity.** N. N. Meiman. *Doklady Akademii Nauk SSSR,* v. 99, no. 2, Nov. 11, 1954, p. 209-212.

Proposes new solution of Cauchy problem for the general, linear and nonlinear thermoconductivity equation. 1 ref. (P11)

75-P. (Russian.) **Determination of Vapor Pressure and Heat of Sublimation of Cobalt in the Range From 1050 to 1250° C.** Iu. V. Kornev and V. N. Golubkin. *Doklady Akademii Nauk SSSR,* v. 99, no. 4, Dec. 1, 1954, p. 565-567.

Investigation by discharge of vapor from small nozzle and use of radioactive tracers of Co^{60}. Graph, table. 9 ref. (P12)

76-P. (Russian.) **Relation Between Heat Resistance of Crystals and Their Coefficients of Linear Expansion.** V. P. Zhuze. *Doklady Akademii Nauk SSSR,* v. 99, no. 5, Dec. 11, 1954, p. 711-714.

The linear dependence of heat resistance on the square of the coefficient of linear expansion holds only for materials in which heat transfer is accomplished basically by phonons. Graph, table. 16 ref. (P11, Ge, In, Sb, Si, Fe, Al, Mg, Te, Pb, Ag, Li)

77-P. (Russian.) **Problem of Superconductivity of Thin Films of Tantalum and Columbium.** I. Khukhareva and A. Shal'nikov. *Doklady Akademii Nauk SSSR,* v. 99, no. 5, Dec. 11, 1954, p. 735-736.

Investigates relation between critical transition temperature and thickness of films obtained by cathodic diffusion during high-vacuum evaporation. Graphs. 2 ref. (P15, Cb, Ta)

78-P. (Russian.) **Investigation of the Temperature Relation of the Thermal and Electric Conductivities of Iron-Copper-Graphite Porous Antifriction Alloys.** V. E. Mikriukov and N. Z. Pozdniak. *Moskovskogo Universiteta, Vestnik, Seriia Fiziko-Matematicheskikh i Estestvennykh Nauk,* v. 9, no. 9, Sept. 1954, p. 51-59.

Chemical compositions of starting materials; data after sintering; effect of copper content. Tables, graphs, micrographs. 5 ref. (P11, P15, H11, Fe, Cu, Mn)

79-P. (Russian.) **Problem of the Superconductivity of Bi_2Pd.** N. E. Alek-

seevskii, N. N. Zhuravlev and I. I. Lifanov. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki*, v. 27, no. 1, July 1954, p. 125-126.

Indicates existence of two modified forms induced by different heat treatments which have different temperatures of transition into the superconductive state. Diagrams. 5 ref. (P15, Bi, Pd)

80-P. (Russian.) **Thermal Conductivity of Phosphor Bronze at Liquid Helium Temperatures.** R. A. Chentsov. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki*, v. 27, no. 1, July 1954, p. 126-128.

Modification of Kohlrausch's method determines relationship between heat and electroconductivity. Diagrams, tables. 6 ref. (P11, P15, Cu)

81-P. (Russian.) **Use of the Method of Electromotive Forces for the Study of Liquid Manganese Alloys.** O. A. Esin and N. A. Vatolin. *Zhurnal Prikladnoi Khimii*, v. 27, no. 12, Dec. 1954, p. 1252-1256.

Activity of separate components calculated; effect of carbon and silicon. Tables, graph. 4 ref. (P12, Si, Mn, Fe)

82-P. (Swedish.) **High Temperature Chemistry.** Lars Gunnar Sillén. *Jernkontorets Annaler*, v. 138, no. 12, 1954, p. 759-778.

Behavior of matter at different temperatures; dependence of equilibrium constants; comparison between solution chemistry of metal and slag melts at 1600° C. Graphs, tables, nomograms. 37 ref. (P12, Zr, W, Au, Al, Si, Ti, Ta, Th, Mg, Mo, Fe, Cu, Zn, Pt, Hg, Na)

83-P. Factors Influencing the Reactivity of Solids With Particular Reference to Metals. J. Arvid Hedvall. *Iron and Steel Institute, Preprints of Symposium Papers*, Dec. 1954, Group I, 50-53.

Survey of factors influencing solid reactions. Graphs. 22 ref. (P13)

84-P. Melting Point of Germanium and the Constitution of Some Ge-Ga Alloys. E. S. Greiner and P. Breidt, Jr. *Journal of Metals*, v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Jan. 1955, p. 187-188.

Thermal analysis data. Graphs, table. 9 ref. (P12, M24, Ge, Ga)

85-P. Thermal Conductivity of Uranium and Several Uranium Alloys. James L. Weeks. *Journal of Metals*, v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Jan. 1955, p. 192.

Corrections for previously reported data. Table. 5 ref. (P11, U)

86-P. (Polish.) **Statistical Relation of Q_r to R_r in Heat Treated Steel TR2.** Zygmunt Jasiewicz. *Hutnik*, v. 21, no. 8, Aug. 1954, p. 249-255.

Collection of data on strength and quality factors. Graphs, tables. (P11, Q23, J general, AY)

87-P. (Book.) **Annual Review of Nuclear Science.** James G. Beckerley, Martin D. Kamen, and Leonard I. Schiff. v. LV. 483 p. 1954. Annual Reviews, Inc. Stanford, Calif.

Seventeen papers covering recent work on particles, isotopes, accelerators, reactions, radiochemistry, counters, and radioactivity. (P general, M25)

88-P. (Book.) **Matter Energy Mechanics.** Jakob Mandelker. 73 p. 1954. Philosophical Library, 15 East 40th St., New York, N. Y. $3.75.

Unification and extension of relativistic mechanics; a new kinetic energy formula; concept of motion at speeds approaching the speed of light. (P general)

89-P. (Book.) **The Thermodynamics of the Steady State.** K. G. Denbigh. 103 p. 1951. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. (Also Methuen & Co., Ltd., London, England. 6s. 6d. net.)

Theory of open reaction systems. (P12)

Q

Mechanical Properties and Test Methods; Deformation

174-Q. Protection of Titanium Metal Against Embrittlement. Herbert R. Toler, Jr. *American Ceramic Society Bulletin*, v. 34, Jan. 1955, p. 4-8.

Rate at 1500° F. is retarded by a vacuum processed ceramic coating. Tables, diagram, photograph, graph. 16 ref. (Q23, Ti)

175-Q. Theory of Thermal Shock Resistance of Brittle Materials Based on Weibull's Statistical Theory of Strength. S. S. Manson and R. W. Smith. *American Ceramic Society, Journal*, v. 38, Jan. 1955, p. 18-27.

Accounts for failure of brittle materials by stress distribution and shows how error can be introduced by use of conventional maximum stress theory. Graphs, table. 6 ref. (Q23)

176-Q. Factors Influencing the Notch Fatigue Strength of N-155 Alloy at Elevated Temperatures. Walter S. Hyler and Ward F. Simmons. *American Society of Mechanical Engineers, Paper no.* 54-A-239, 1954, 29 p.

Effects of stress raisers of various intensities; explanation of notch-bar strengthening. (Q7, Fe, Cr, Ni, Co)

177-Q. Factors Influencing the Notch-Rupture Strength of Heat-Resistant Alloys at Elevated Temperatures. R. L. Carlson, R. J. MacDonald and Ward F. Simmons. *American Society of Mechanical Engineers, Paper no.* 54-A-240, 1954, 29 p.

Stress-rupture data for notched and unnotched bars of S-816, Inconel "X" and Waspaloy from 1200 to 1600° F. Evaluation of individual cases. Graphs, tables, diagrams, micrographs. 5 ref. (Q4, Q7, SG-h)

178-Q. Some Observations on the Ductility of Ferritic Nodular Iron. G. N. J. Gilbert. *British Cast Iron Research Association. Journal of Research and Development*, v. 5, Dec. 1954, p. 470-472 + 2 plates.

Suggests that proof stress and elongation at maximum load be used as criteria for evaluation instead of yield stress and total elongation. Table, photograph, graph. (Q23, CI)

179-Q. Effects of Residual Stresses in Welded Structures. G. M. Boyd. *British Welding Journal*, v. 1, Dec. 1954, p. 560-566.

Stress behavior analyzed from tensile strength, fatigue, stress corrosion, brittle fracture, elastic stability, reaction stresses and weld cracking. Diagrams, graphs, photograph. 21 ref. (Q25, CN)

180-Q. An Evaluation of the Recovery Theory of Creep. H. H. Bleakney. *Canadian Journal of Technology*, v. 33, Jan. 1955, p. 56-66.

Phenomenon of creep-rupture embrittlement may not be inconsistent with the recovery theory. Suggests the opposing influences of strain-hardening and thermal softening are fundamental forces in creep. Graphs, tables. 20 ref. (Q3, Al)

181-Q. The Effect of High Loading on the Kinetic Friction of Ice. C. D. Niven. *Canadian Journal of Physics*, v. 32, Dec. 1954, p. 782-789.

Results of tests with stainless steel, bakelite and Teflon reveal that Amontons' law does not hold true at high loadings and that the friction of ice is related to pressure and adhesion. Graphs, diagram, photograph. 9 ref. (Q9, SS)

182-Q. Room-Temperature Ductile Chromium. H. Johansen and G. Asai. *Electrochemical Society, Journal*, v. 101, Dec. 1954, p. 604-612.

Preparation and some mechanical properties. Techniques of making brittle chromium ductile by removal of surface layers. Photographs, micrographs, tables, graph. 17 ref. (Q23, Cr)

183-Q. Combined Tension and Torsion Machine for Relaxation Tests. A. E. Johnson and N. E. Frost. *Engineer*, v. 198, Dec. 17, 1954, p. 834-835.

Creep testing under combinations of tension loads up to 600 lb. and torques up to 1000 in.-lb. over a temperature range of 20 to 800° C. Diagrams. (Q3)

184-Q. Diamond Indentors for Rockwell Hardness Testing. F. R. Tolmon and Joyce F. Hall. *Engineering*, v. 178, Dec. 10, 1954, p. 760-762.

Further developments in precision measurement and an evaluation of prescribed form. Micrographs, interferograms, diagrams. 1 ref. (Q29)

185-Q. Creep of High-Purity Nickel. William D. Jenkins, Thomas G. Digges and Carl R. Johnson. *Journal of Research, National Bureau of Standards*, v. 58, Dec. 1954, p. 329-352.

Influence of stress, temperature and prior-strain history on creep behavior of the initially annealed metal; evaluation of prestraining effect in creep on hardness and tensile properties at room temperature. Tables, graphs, photographs, micrographs. 13 ref. (Q3, Ni)

186-Q. Residual Stresses—How Dangerous Are They? Walter Soete. *Metal Progress*, v. 67, Jan. 1955, p. 108-113.

In sound structures residual stresses help propagate brittle fracture at low temperature, affect the yield point and increase corrosion rates. In structures or machine parts containing minor physical discontinuities, residual stresses may induce brittle fracture at low temperature. Diagrams. (Q25)

187-Q. A German View of Brittle Welded Structures. Edouard Houdremont. *Metal Progress*, v. 67, Jan. 1955, p. 114-120, 200, 202.

Tentative German standards specify steels for welded structures by impact strength at definite temperature. Causes of brittleness in steels, commercial means of manufacturing tough metal. Author believes annealing of weldments—even local annealing of joints—will insure safe performance of a well-designed and honestly fabricated structure. Graphs, micrographs, tables. (Q23, Q6, K general, ST)

188-Q. Criteria for Selecting Experimental Stress Analysis Methods. A. J. Durelli and E. A. Phillips. *Product Engineering*, v. 26, Jan. 1955, p. 182-191.

Nine concepts basic to selection of experimental methods; most important methods evaluated. Diagrams, stress patterns, table. 5 ref. (Q25)

189-Q. Titanium: No Time Limit on Toughness. W. L. Finlay, J. P. Catlin and D. W. Kaufmann. *Steel*, v. 136, Jan. 17, 1955, p. 92-93.

Room-temperature ductility of alpha titanium is not appreciably af-

fected by combinations of time up to 1600 hr., temperatures up to 1000° F., and stresses to cause up to 10% elongation. Tables. (Q23, Ti)

190-Q. Brittle Failures in Ships and Other Steel Structures. K. K. Cowart. Paper from "Symposium on Effect of Temperature on the Brittle Behavior of Metals With Particular Reference to Low Temperatures". ASTM Special Technical Publication No. 158, p. 3-10.

Examples of failures and conditions of their occurrence. Photographs. 5 ref. (Q26, Q23, ST)

191-Q. Analysis of Brittle Behavior in Ship Plates. Morgan L. Williams. Paper from "Symposium on Effect of Temperature on the Brittle Behavior of Metals With Particular Reference to Low Temperatures". ASTM Special Technical Publication No. 158, p. 11-41; disc., p. 42-44.

Factors contributing to fracture on more than 130 plates. Relations between service experience, notch sensitivity and chemical composition. Photographs, graphs, diagrams. 20 ref. (Q26, Q23)

192-Q. A Critical Survey of Brittle Failure in Carbon Plate Steel Structures Other Than Ships. M. E. Shank. Paper from "Symposium on Effect of Temperature on the Brittle Behavior of Metals With Particular Reference to Low Temperatures". ASTM Special Technical Publication No. 158, p. 45-108; disc., p. 108-110.

Histories of various failures in industrial installations. Important factors in causes of brittle fracture. Photographs, diagrams, tables. 134 ref. (Q26, Q23, CN)

193-Q. Interest of the Army in Brittle Failures. Thurston T. Paul. Paper from "'Symposium on Effect of Temperature on the Brittle Behavior of Metals With Particular Reference to Low Temperatures". ASTM Special Technical Publication No. 158, p. 111-114; disc., p. 115.

Significance of brittleness in steels for use in heavy guns and armor. (Q26, Q23, ST)

194-Q. Theory of Brittle Fracture and Criteria for Behavior at Low Temperatures. Earl R. Parker. Paper from "Symposium on Effect of Temperature on the Brittle Behavior of Metals With Particular Reference to Low Temperatures". ASTM Special Technical Publication No. 158, p. 116-130; disc., p. 131-132.

Treatment of factors leading to either cleavage or shear fractures. Tests for determining relative brittleness. Photographs, graphs, micrographs, diagrams. 21 ref. (Q26, Q23, CN)

195-Q. Brittle Fracture. S. L. Hoyt. Paper from "Symposium on Effect of Temperature on the Brittle Behavior of Metals With Particular Reference to Low Temperatures". ASTM Special Technical Publication No. 158, p. 133-143; disc., p. 144-146.

Notch-bar testing and its use in appraising steels for critical service conditions. Graphs, tables. 11 ref. (Q26, CN)

196-Q. Metallurgical Aspects of Low-Temperature Behavior in Ferrous Materials. C. H. Lorig. Paper from "Symposium on Effect of Temperature on the Brittle Behavior of Metals With Particular Reference to Low Temperatures". ASTM Special Technical Publication No. 158, p. 147-162; disc., p. 163.

Effects of composition and manufacturing variables on sensitivity to embrittlement. Graphs. 40 ref. (Q23, ST)

197-Q. Fundamentals of Fractures in Metals. M. Gensamer. Paper from "Symposium on Effect of Temperature on the Brittle Behavior of Metals With Particular Reference to Low Temperatures". ASTM Special Technical Publication No. 158, p. 164-173; disc., p. 174-175.

Evaluation of effects of stress states on fracture behavior. Graphs, diagram. 4 ref. (Q26)

198-Q. The Effect of Size Upon Fracturing. G. R. Irwin. Paper from "Symposium on Effect of Temperature on the Brittle Behavior of Metals With Particular Reference to Low Temperatures". ASTM Special Technical Publication No. 158, p. 176-188; disc., p. 188-194.

Statistical relationships on effects of specimen size and fracture behavior. Graphs, diagrams. 13 ref. (Q26, ST, Al)

199-Q. Brittleness, Triaxiality, and Localization. Wendell P. Roop. Paper from "Symposium on Effect of Temperature on the Brittle Behavior of Metals With Particular Reference to Low Temperatures". ASTM Special Technical Publication No. 158, p. 195-202.

Effects of stress states on mode of fracture. Diagram, graph. 13 ref. (Q26)

200-Q. Effect of Metallurgical Structures on the Impact Properties of Steels. John A. Rinebolt. Paper from "Symposium on Effect of Temperature on the Brittle Behavior of Metals With Particular Reference to Low Temperatures". ASTM Special Technical Publication No. 158, p. 203-214; disc., p. 215.

Effects of microstructures and composition on impact properties of five series of steels. Tables, micrographs, graphs. 6 ref. (Q6)

201-Q. Evaluation of the Significance of Charpy Tests. William S. Pellini. Paper from "Symposium on Effect of Temperature on the Brittle Behavior of Metals With Particular Reference to Low Temperatures". ASTM Special Technical Publication No. 158, p. 216-258; disc., p. 259-261.

Fracture and ductility transition concepts. Application of Charpy V-notch data to engineering design. Diagrams, graphs, photographs. 9 ref. (Q6, Q23, ST, CI)

202-Q. Significance of V-Notch Impact Test in Evaluation of Armor Plate. Abraham Hurlich. Paper from "Symposium on Effect of Temperature on the Brittle Behavior of Metals With Particular Reference to Low Temperatures". ASTM Special Technical Publication No. 158, p. 262-274.

Correlation of Charpy V-notch properties with metallurgical characteristics and ballistic performance of armor steels. Graphs, photographs, tables. (Q6, AY)

203-Q. Notch-Bend Tests for Evaluating the Properties of Weldments. Robert D. Stout. Paper from "Symposium on Effect of Temperature on the Brittle Behavior of Metals With Particular Reference to Low Temperatures". ASTM Special Technical Publication No. 158, p. 275-283; disc., p. 284-285.

Effects of geometrical and metallurgical changes introduced by welding. Tests for evaluation of variables. Diagrams, graphs, micrographs. 9 ref. (Q5, K general, ST)

204-Q. Reproducibility of Keyhole Charpy and Tear-Test Data on Laboratory Heats of Semikilled Steel. R. H. Frazier, J. W. Spretnak and F. W. Boulger. Paper from "Symposium on Effect of Temperature on the Brittle Behavior of Metals With Particular Reference to Low Temperatures". ASTM Special Technical Publication No. 158, p. 286-303; disc., p. 304-307.

Analytical and mechanical tests on 18 heats showed good reproducibility on replicate heats. Keyhole Charpy and Navy tear-test specimens determined transition temperatures. Tables, diagram, graphs. 13 ref. (Q6, CN)

205-Q. Effect of Specimen Preparation on Notch-Toughness Behavior of Keyhole Charpy Specimens in the Transition Temperature Zone. R. W. Vanderbeck, R. W. Lindsay, H. D. Wilde, W. T. Lankford and S. C. Snyder. Paper from "Symposium on Effect of Temperature on the Brittle Behavior of Metals With Particular Reference to Low Temperatures". ASTM Special Technical Publication No. 158, p. 308-320; disc., p. 320-325.

Statistical analysis shows little effect of specimen preparation method on transition range for four carbon and one alloy steels. Graphs, tables, diagram, micrographs. 3 ref. (Q6, CN, AY)

206-Q. Low-Temperature Impact Properties of Titanium. David E. Driscoll. Paper from "Symposium on Effect of Temperature on the Brittle Behavior of Metals With Particular Reference to Low Temperatures". ASTM Special Technical Publication No. 158, p. 326-330; disc., p. 331.

Test data for various alloys. Graphs. (Q6, Ti)

207-Q. Effect of Boron on the Impact Properties of Quenched and Tempered Steels. Harry Schwartzbart and J. P. Sheehan. Paper from "Symposium on Effect of Temperature on the Brittle Behavior of Metals With Particular Reference to Low Temperatures". ASTM Special Technical Publication No. 158, p. 332-343; disc., p. 343-344.

Tests on quenched and tempered 2345 and 8120 steels with various amounts of boron. Boron had marked effect on variation of transition temperature with tempering temperature. Tables, graphs, micrographs. 14 ref. (Q6, Q23, AY)

208-Q. The Notched-Bar Impact Properties of Tempered Martensite in Medium-Carbon, Medium-Alloy Grades of Steel. M. Baeyertz, W. F. Craig, Jr., and J. P. Sheehan. Paper from "Symposium on Effect of Temperature on the Brittle Behavior of Metals With Particular Reference to Low Temperatures". ASTM Special Technical Publication No. 158, p. 345-363; disc., p. 364.

Review and analysis of published and unpublished data. Graphs, photograph, table. 12 ref. (Q6, AY)

209-Q. Notch Sensitivity of Steels. E. J. Ripling. Paper from "Symposium on Effect of Temperature on the Brittle Behavior of Metals With Particular Reference to Low Temperatures". ASTM Special Technical Publication No. 158, p. 365-372; disc., p. 373.

Portion of room-temperature notch brittleness due to transition behavior. Graphs, diagrams. 10 ref. (Q23, AY)

210-Q. Effect of Carbon and Nitrogen on the Tensile Deformation of High-Purity Iron at 81 F (27 C) and at −321 F (−196 C). Lewis D. Hall. Paper from "Symposium on Effect of Temperature on the Brittle Behavior of Metals With Particular Reference to Low Temperatures". ASTM Special Technical Publication No. 158, p. 374-381.

Tests show that carbon adds to ductility at −321° F. but nitrogen has an embrittling effect at both temperatures. Tables, graph, micrographs. 13 ref. (Q23, Fe)

211-Q. Tension Impact Strength and Strain Distribution at Room and Sub-Zero Temperatures of Stainless

and Other Steels. C. R. Mayne, V. N. Krivobok and C. W. Muhlenbruch. Paper from "Symposium on Effect of Temperature on the Brittle Behavior of Metals With Particular Reference to Low Temperatures". ASTM Special Technical Publication No. 158, p. 382-400; disc., p. 401-404.

Effects of composition, tensile properties, temperature, gage length and notches on stainless steel sheet samples. Tables, diagrams, photographs, graphs. 9 ref. (Q6, SS)

212-Q. Ductile and Brittle Failure in Ferritic Nodular Irons (Nickel-Magnesium Type). G. N. J. Gilbert. Paper from "Symposium on Effect of Temperature on the Brittle Behavior of Metals With Particular Reference to Low Temperatures". ASTM Special Technical Publication No. 158, p. 415-431.

Effects of composition and heat treatment. Tables, micrograph, diagrams, graphs, photographs. 6 ref. (Q23, Q26, J general, CI)

213-Q. Low-Temperature Toughness of Flake and Spheroidal Graphite Cast Iron. J. S. Vanick. Paper from "Symposium on Effect of Temperature on the Brittle Behavior of Metals With Particular Reference to Low Temperatures". ASTM Special Technical Publication No. 158, p. 405-412; disc., p. 413-414.

Effects of microstructure and composition on properties down to −300° F. Tables, graphs, photograph. 2 ref. (Q23, M27, CI)

214-Q. The Low-Temperature Properties of Cast Irons. G. N. J. Gilbert. Paper from "Symposium on Effect of Temperature on the Brittle Behavior of Metals With Particular Reference to Low Temperatures". ASTM Special Technical Publication No. 158, p. 432-455.

Effects of composition and microstructure on impact and tensile properties down to −180 F. Tables, graphs. 4 ref. (Q6, Q23, M27, CI)

215-Q. The Impact Properties of Ferritic Ductile Iron. R. W. Kraft. Paper from "Symposium on Effect of Temperature on the Brittle Behavior of Metals With Particular Reference to Low Temperatures". ASTM Special Technical Publication No. 158, p. 456-472; disc., p. 472-474.

No sharp transition temperature detected. Effects of silicon content. Diagram, tables, graphs, photograph. 8 ref. (Q6, Q23, CI)

216-Q. (English.) **A Study of the Plastic Deformation of Copper Single Crystals.** C. R. Cupp and B. Chalmers. *Acta Metallurgica,* v. 2, no. 6, Nov. 1954, p. 803-809.

Stepwise tensile loading showed a delay between load application and plastic strain. Effects of dissolved hydrogen on mechanical properties. Diagrams, table, graphs. 19 ref. (Q27, Cu)

217-Q. (English.) **The Effect of Short-Time Moderate Flux Neutron Irradiations on the Mechanical Properties of Some Metals.** F. W. Kunz and A. N. Holden. *Acta Metallurgica,* v. 2, no. 6, Nov. 1954, p. 816-822.

Tests on single crystals showed flow stress of iron and zinc was increased by radiation but lead was unchanged. Review of radiation hardening mechanisms. Graphs, table. 13 ref. (Q general, Fe, Pb, Zn)

218-Q. (English.) **X-Ray Line Broadening From Metals Deformed at Low Temperatures.** M. S. Paterson. *Acta Metallurgica,* v. 2, no. 6, Nov. 1954, p. 823-830.

Tests on copper, aluminum and nickel support hypothesis that broadening is due to internal stresses arising from elastic distortion of glide lamellae. Tables, graphs, diagram. 19 ref. (Q25, M22, Cu, Al, Ni)

219-Q. (English.) **Etchpits and Dislocations Along Grain Boundaries, Sliplines and Polygonization Walls.** S. Amelinckx. *Acta Metallurgica,* v. 2, no. 6, Nov. 1954, p. 848-853.

A one to one relation was established for etchpits and dislocations in crystals of rock salt. Micrographs. 13 ref. (Q24)

220-Q. (English.) **Strain Hardening in Face-Centered Cubic Metal Crystals.** J. Sawkill and R. W. K. Honeycombe. *Acta Metallurgica,* v. 2, no. 6, Nov. 1954, p. 854-864.

Shear and tensile tests on gold and tensile tests on aluminum crystals showed two types of deformation bands. Diagrams, photograph, micrographs, graphs. 22 ref. (Q24, Au, Al)

221-Q. (English.) **Deformation Textures of Face-Centered Cubic Metals.** E. A. Calnan. *Acta Metallurgica,* v. 2, no. 6, Nov. 1954, p. 865-874.

Differences in deformation textures of aluminum, copper, alpha brass and other copper alloys explained by rotation of crystals. Tables, diagrams. 19 ref. (Q24, Al, Cu)

222-Q. (English.) **Grain Boundary Shear in Aluminum.** F. Weinberg. *Acta Metallurgica,* v. 2, no. 6, Nov. 1954, p. 889-891.

Creep tests on tricrystal test pieces show alternate shear and grain boundary migration. Diagram, photographs, micrograph. 1 ref. (Q2, Q3, Al)

223-Q. (Czech.) **Examination of Mechanical Properties of Wrought Al-Zn6-Mg-Cu Alloy.** Petr Skulari and Vladivoj Ocenasek. *Hutnické Listy,* v. 9, no. 11, Nov. 1954, p. 655-666.

Test data for high and low temperatures. Structural changes during heat treatment. Tables, graphs, refractograms, diagram. 10 ref. (Q general, N general, J general, Al, Zn, Mg, Cu)

224-Q. (Dutch.) **Hardness and Plasticity of Metals.** J. H. Zaat. *Metalen,* v. 9, no. 22, Nov. 30, 1954, p. 353-358; no. 23, Dec. 15, 1954, p. 373-380.

Relationship between hardness and the general stress-deformation curve. Practical applications. Graphs, table. 11 ref. (Q29, Q23)

225-Q. (French.) **Mechanical Properties of Bronze U-E12 P.** Marcel Cirou and Pierre-Julien le Thomas. *Fonderie,* 1954, no. 106, Nov., p. 4235-4240.

Effects of composition and casting variables. Diagrams, graphs. (Q general, Cu, Sn)

226-Q. (French.) **Behavior of Metallic Cables Subjected to Tension.** R. Goldschmidt. *Helvetica Physica Acta,* v. 27, no. 6, 1954, p. 508-512.

Describes apparatus which measures tension, elongation, moment of torsion and angle of torsion simultaneously. Diagram, photograph. (Q27, Q1)

227-Q. (French.) **Temper Brittleness of Extra-Soft Iron-Chromium Ferritic Steels.** H. Laplanche. *Métallurgie et la construction mécanique,* v. 86, no. 11, Nov. 1954, p. 837 + 8 pages.

Effects of embrittlement on mechanical, physical and corrosion properties. Causes of embrittlment. Graphs, tables. 28 ref. (Q23, SS)

228-Q. (Polish.) **Analysis of Tensile Test Diagram of Ductile Metals.** Zygmunt Polek. *Wiadomosci Hutnicze,* v. 10, no. 11, Nov. 1954, p. 310-314.

Types of mechanical tests and deformation; formulas. Graphs, diagram. 4 ref. (Q23, Q27, ST, Cu, Al, Mg)

229-Q. (Russian.) **Wear Resistance of Tractor and Internal Combustion Engine Parts Made of High-Quality Cast Iron.** B. N. Seredenko. *Liteinoe Proizvodstvo,* 1954, no. 8, Nov., p. 3-6.

Mechanical properties and compositions of cast irons and cast steels for various applications. Tables, graphs. (Q9, CI, AY)

230-Q. (Russian.) **Phenomenon of Brittleness in High-Strength Cast Iron.** N. G. Girshovich and M. P. Simanovskii. *Liteinoe Proizvodstvo,* 1954, no. 8, Nov., p. 12-14.

Effects of heat treatment and composition. Exact case has not been determined. Table, graphs. 3 ref. (Q23, CI)

231-Q. (Russian.) **Ultimate Symmetry of Deformation Bands.** L. A. Tolokonnikov. *Prikladnaia Matematika i Mekhanika,* v. 18, no. 5, Sept.-Oct. 1954, p. 619-626.

Mathematical analysis. Diagrams, graph. 1 ref. (Q24)

232-Q. Arctic Regions Pose Tough Metallurgical Problems. F. W. Myers, Jr. *Iron Age,* v. 175, Jan. 20, 1955, p. 79-82.

Typical failures experienced in military equipment. Description of "windchill" effects. Photographs, graph. 6 ref. (Q general, ST, Al, Mg)

233-Q. Measurement of Internal Stress of Cobalt Deposited Electrolytically From Cobalt Fluoborate Baths. D. M. Fegredo and J. Balachandra. *Journal of Scientific & Industrial Research,* v. 13, sec. B, Nov. 1954, p. 753-755.

Stress is lowered by increasing thickness of deposit and by raising current density and temperature. Table, graphs. 8 ref. (Q25, L17, Co)

234-Q. Production of Specimens for Static and Fatigue Testing. T. S. Braithwaite. *Machinery (London),* v. 86, Jan. 7, 1955, p. 34-36.

Special machining and polishing methods. Diagrams, photographs. (Q7, G17, L10, L11)

235-Q. Fatigue of Metals—Our Knowledge and the Deficiencies in Our Knowledge. P. L. Teed. *Shell Aviation News,* 1954, no. 197, Nov., p. 14-21.

Stresses, structure of metals and structural changes as factors in the mechanism of fatigue. Photographs, micrographs, graphs, table. 43 ref. (To be continued.) (Q7, Al, Cu, Fe, Au)

236-Q. Behavior of Materials Under Conditions of Thermal Stress. S. S. Manson. *U. S. National Advisory Committee for Aeronautics, Report* 1170, 1954, 34 p.

Reviews mathematics of thermal shock, with derivation of formula for correlating shock behavior with material properties; methods for minimizing thermal stress. Graphs, diagrams, photographs, tables. 20 ref. (Q25, Al, Be, Ti, SS, AY, Cu, Ni)

237-Q. (German.) **Fatigue and Tensile-Impact Tests on Round-Link Chains.** Karl Wellinger and Adolf Stanger. *Glückauf,* v. 90, nos. 51-52, Dec. 18, 1954, p. 1670-1673.

Effect of heat treatment on strength properties of chain links. Tables, photographs, diagrams, graphs. 2 ref. (Q7, Q6, J general)

238-Q. (German.) **A Contribution to the Technology of the Relationship Between the Carbon, Ferrite, and Titanium Contents of Austenitic Chrome-Nickel Steels and the Embrittlement in a Brittle Phase at Higher Titanium Contents.** W. Goedecke. *Werkstoffe und Korrosion,* v.

5, no. 12, Dec. 1954, p. 488-496.

Influence of carbon and carbon bonding with titanium on ferrite content. Micrographs, graphs, tables, photograph, diagram. (Q23, Ti, AY)

239-Q. (Hungarian.) **Heat Treatable Silver-Copper Alloys.** Fülöp Balazs and Gyözo Kilar. *Kohaszati Lapok,* v. 9, no. 8, Aug. 1954, p. 374-384.

Changes in mechanical properties resulting from heat treating. Graphs, micrographs, table. (To be continued.) (Q general, J general, Ag, Cu)

240-Q. (Polish.) **Plastic Properties of Cast Metals by Hardness and Tensile Testing.** Aleksander Krupkowski. *Archiwum Gornictwa i Hutnictwa,* v. 2, no. 1, 1954, p. 27-55.

Combination of hardness and tensile data provides good criterion of plasticity. Tables, graphs, diagram. 4 ref. (Q23)

241-Q. (Polish.) **Influence of Iron and Zinc on the Technological Properties of Aluminum Alloy Pressure Die Castings.** Kazimierz Korecki and Tadeusz Welkens. *Przeglad Odlewnictwa,* v. 4, no. 9, Sept. 1954, p. 251-255.

Tests to determine best ratios. Chemical compositions in domestic and foreign alloys. Microstructures. Tables, micrographs. 5 ref. (Q general, E13, Al)

242-Q. (Russian.) **Diagrams of Strength Properties of Metals.** M. M. Khrushchov and M. A. Babichev. *Doklady Akademii Nauk SSSR,* v. 99, no. 3, Nov. 21, 1954, p. 395-398.

Wear resistance characteristics of steels, copper, zinc and aluminum. Graphs. 3 ref. (Q23, AY, ST, Cu, Zn, Al)

243-Q. (Russian.) **Influence of Hydrogen on the Properties of Alloys.** N. A. Galaktionova. *Doklady Akademii Nauk SSSR,* v. 99, no. 3, Nov. 21, 1954, p. 411-414.

Effect on cast iron-nickel-aluminum alloys with variations in hydrogen content, by electrolytic impregnation, in 0.1 normal sulfuric acid solution at various temperatures and pressures. Micrographs, graph, table. 4 ref. (Q general, P general, CI, Ni, Al)

244-Q. (Russian.) **Resistance of Ductile Metals to Brittle Fracture.** G. V. Uzhik. *Doklady Akademii Nauk SSSR,* v. 99, no. 5, Dec. 11, 1954, p. 685-687.

Experimental data on notched tensile tests. Graphs, photograph. 5 ref. (Q26, AY, CN)

245-Q. (Russian.) **Kinetics of Residual Deformation Stipulated by the Self-Diffusion Relaxation of Stresses.** N. S. Fastov. *Doklady Akademii Nauk SSSR,* v. 99, no. 5, Dec. 11, 1954, p. 753-756.

Theoretical data for twisting of a round rod, pure bending of a prismatic rod and contraction of a spherical pore. Equations. 4 ref. (Q25, N1)

246-Q. (Russian.) **Investigation of the Plastic Properties of Technical Titanium.** L. N. Sokolov, V. P. Eliutin and V. I. Zalesskii. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* 1954, no. 3, March, p. 110-115.

Relation of plasticity, impact strength and tensile strength to temperature. Graphs, tables, micrographs. (Q23, Ti)

247-Q. (Russian.) **Investigation of the Mechanical Properties of Iron-Copper-Graphite Porous Antifriction Alloys.** V. E. Mikriukov and N. Z. Pozdniak. *Moskovskogo Universiteta, Vestnik. Seriia Fiziko-Matematicheskikh i Estestvennykh Nauk,* v. 9, no. 10, Oct. 1954, p. 49-57.

Strength and hardness tests in relation to proportion of components, porosity and methods of producing the alloys. Tables, graphs, micrographs. 9 ref. (Q23, Q29, H general, Fe, Cu)

248-Q. (Russian.) **Strength of Cylindrical and Conical Shells of Circular Cross-Section During Simultaneous Action of Axial Compression and External Normal Pressure.** Kh. M. Mushtari and A. V. Sachenkov. *Prikladnaia Matematika i Mekhanika,* v. 18, no. 6, Nov.-Dec. 1954, p. 667-674.

Mathematical treatment. 6 ref. (Q28)

249-Q. **Predicting Fatigue Failures in Aluminum Alloy Structures.** C. R. Smith. *Aero Digest,* v. 70, Jan. 1955, p. 37-41.

Calculating fatigue life from theoretical stress concentration factor and the loading spectrum. Diagram, graphs, tables. 7 ref. (Q7, Al)

250-Q. **The Effect of Dispersions on Creep Properties of Aluminum-Copper Alloys.** W. H. Giedt, O. D. Sherby and J. E. Dorn. *ASME Transactions,* v. 77, Jan. 1955, p. 57-63; disc., p. 62-63.

Properties are primarily dependent on volumetric mean free path of the copper-aluminum particles and independent of minor variations in composition and heat treatment. Graphs, table. 9 ref. (Q3, Cu, Al)

251-Q. **Fatigue Strength of Flame-Cut Specimens in Bright Mild Steel.** F. Koenigsberger and Z. Garcia-Martin. *British Welding Journal,* v. 2, Jan. 1955, p. 37-41.

Condition of the edges is more important than the quality of the cut. Diagrams, graphs, photographs. 3 ref. (Q7, G22, CN)

252-Q. **The Velocity of Brittle Fracture.** D. K. Roberts and A. A. Wells. *Engineering,* v. 178, Dec. 24, 1954, p. 820-821.

Terminal velocity shown to be a definite fraction of the elastic-wave velocity. Graphs, table. 12 ref. (Q26, ST)

253-Q. **Strength in Blistering Heat, Toughness at Arctic Cold.** *INCO,* v. 26, Jan. 1955, p. 2-7.

Nickel alloys are key to high performance in modern aircraft. Photographs, diagram. (Q23, T24, Ni)

254-Q. **Fatigue Properties of Sintered Copper Compacts.** O. J. Dunmore and G. C. Smith. *Iron and Steel Institute, Preprints of Symposium Papers,* Dec. 1954, Group III, p. 61-65 + 2 plates.

Alternating torsion of specimens produced by various pressing and sintering conditions. Diagrams, graphs, micrographs. 3 ref. (Q7, H14, H15, Cu)

255-Q. **Energy Stored During Fatigue of Copper.** L. M. Clarebrough, M. E. Hargreaves, A. K. Head and G. W. West. *Journal of Metals,* v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 99-100.

Measurements confirm that energy is stored during fatigue. No evidence of recrystallization was found. Table, graph. 8 ref. (Q7, Cu)

256-Q. **Stress Analysis of a Single Crystal in Pure Torsion.** Norman Brown. *Journal of Metals,* v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 134-135.

Mathematical analysis of dislocation behavior and deformation of a hexagonal crystal. Table. 5 ref. (Q25)

257-Q. **Contribution of Crystal Structure to the Hardness of Metals.** W. Chubb. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 189-192.

Hardness measurements up to 1000° C. on cobalt, iron, titanium, uranium and zirconium show that body-centered-cubic are always the softer structures when they are involved in a transformation. Graphs, diagram. 12 ref. (Q29, M26, Co, Fe, Ti, U, Zr)

258-Q. **Plastic Deformation of Germanium and Silicon by Torsion.** Earl S. Greiner. *Journal of Metals,* v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 203-205.

Etch pits show locations of dislocations and reveal planes which were active in slip. Photographs, diagrams, micrographs. 9 ref. (Q24, Ge, Si)

259-Q. **Study of a New Mode of Plastic Deformation in Zinc Crystals.** J. J. Gilman. *Journal of Metals,* v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 206-214.

Characteristics of "μ-bands" formed during compression of zinc single crystals. A dislocation model for this phenomenon. Diagrams, graphs, photographs, micrographs. 13 ref. (Q24, M26, Zn)

260-Q. (English.) **Creep of Metal Crystals.** Tore Holth. Paper from "International Symposium on the Reactivity of Solids, Gothenburg 1952, Proceedings". Ingeniörsvetenskapsakademien and Chalmers Tekniska Högskola, p. 909-911.

Creep appears to be a boundary process in regions of reduced crystal order involving dislocation or the movement of stressed atoms. (Q3)

261-Q. (French.) **Hot Tear Test Specimen for Cast Iron.** Edouard Gabel. *Fonderie,* 1954, no. 107, Dec., p. 4272-4280; disc., p. 4280.

Study of susceptibility to fracture during cooling by using a test piece sensitive to variation of phosphorus content. Diagrams, photographs, graphs, table. 12 ref. (Q26, CI)

262-Q. (French.) **Influence of Silicon, Copper, Zinc, and Magnesium Contents on the Properties of Standardized Light Alloy $AlSi_6Cu_3$.** E. Bertram, W. Patterson and R. Kummerle. *Fonderie,* 1954, no. 107, Dec., p. 4294-4298.

Influence of additions on cracking, casting ability and mechanical properties. Diagrams, graphs, table. (Q general, E general, Si, Cu, Zn, Mg, Al)

263-Q. (German.) **Tensile Tests on Very Long Specimens.** Walter Jäniche and Wilhelm Puzicha. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 11-12, Nov.-Dec. 1954, p. 589-593.

Increasing test length of steel wire from 0.2 to 19 m. caused a decrease of strength. Table, diagrams, graph. 6 ref. (Q27, CN)

264-Q. (German.) **The Stress Pattern During Necking of the Tensile-Test Specimen.** Alfred Krisch. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 11-12, Nov.-Dec. 1954, p. 595-598.

Computation of the stress and deformation; conditions for the fracture without external energy due to elastic stresses; practical conclusions applied to large steel structures. Graphs. 14 ref. (Q27, ST)

265-Q. (German.) **Atomistic Concepts of Deformation and Recrystallization**

Processes in Metals. Alfred Schäfer. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 11-12, Nov.-Dec. 1954, p. 621-627.

Mathematical discussion with consideration of vibrations, stresses and lattice distortions. 12 ref. (Q24, N5)

266-Q. (German.) **The Damping Behavior of Stretched Commercial Iron.** Werner Köster, Lothar Bangert and Rolf Hahn. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 11-12, Nov.-Dec. 1954, p. 569-576; disc., p. 756-758.

Determination of damping properties of cold worked iron between 20 and 400° C; explanation of maxima at 40 and 200° C. Table, graphs, micrograph, diagrams. 31 ref. (Q9, Fe)

267-Q. (German.) **Investigations of the Crystal Boundaries in Deformed Metals, Especially by Microhardness Measurements.** H. E. Tuchschmid. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 20, no. 12, Dec. 1954, p. 382-415.

Influence of grain boundary precipitation on work hardening of 18-8 steel and an aluminum-magnesium alloy. Diagrams, tables, micrographs, graphs, X-ray diffraction patterns. 68 ref. (Q24, Q29, M26, SS, Al, Mg)

268-Q. (German.) **Stress Measurements on Cast Iron.** Heinz Schlechtweg. *Zeitschrift für Metallkunde,* v. 45, no. 12, Dec. 1954, p. 690-694.

Mathematical considerations in the evaluation of stress measurements. Tables. 6 ref. (Q25, CI)

269-Q. (German.) **Investigations on the Load-Dependence of Vickers Microhardness. II.** Helmut Bückle. *Zeitschrift für Metallkunde,* v. 45, no. 12, Dec. 1954, p. 694-701.

Effect of bulges around impressions on hardness reading. Diagrams, micrographs, interference pictures, graphs. 12 ref. (Q29)

270-Q. (Polish.) **Analysis of Stress Distribution in Hydraulic Press Cylinders With the Use of Resistance Wire Strain Gauges.** A. Karamara, M. Misiag and J. Wozniacki. *Prace Instytutu Odlewnictwa,* v. 4, no. 2, 1954, p. 155-173.

Stress analysis methods for cast iron; conversion formulas for calculating stresses. Diagrams, circuit diagrams, tables, graph 12 ref. (Q25, CI)

271-Q. (Russian.) **Concentration of Stresses During Elasto-Plastic Deformations.** V. M. Panferov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* 1954, no. 4, Apr., p. 47-66 + 2 plates.

Mathematical analysis. Graphs, micrographs. 8 ref. (Q21, Q24)

272-Q. (Russian.) **Change of Hardness of Pure Metals During Heating.** M. G. Lozinskii and S. G. Fedotov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* 1954, no. 4, Apr., p. 80-85 + 1 plate.

Measuring equipment and techniques. Microstructure. Photographs, micrographs, graphs. 22 ref. (Q29, M27, W, Co, Fe, Cu, Ti, Mo, Al, Ni)

273-Q. (Russian.) **Some Peculiarities of Diffusion Plasticity During the Relaxation of Stresses in Metals.** I. A. Oding and V. S. Ivanova. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* 1954, no. 5, May, p. 81-90.

Temperature relationship; effect of aging and quenching. Tables, graphs, diagrams. 16 ref. (Q23, Q25, N7, ST)

274-Q. (Russian.) **Influence of Preliminary Plastic Deformation on the Relaxation of Stress in Pure Metals.** B. M. Rovinskii and V. G. Liuttsau. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* 1954, no. 6, June, p. 57-60.

Experimental data for aluminum and copper tested at room temperature. Graphs, tables. 3 ref. (Q24, Q25, Al, Cu)

275-Q. (Russian.) **Plastic Deformation of Metals Under Static Loading and Standard Temperature.** M. V. Klassen-Nekliudova. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* 1954, no. 7, July, p. 87-96 + 4 plates.

Possible mechanisms of plastic deformation. Diagrams, micrographs. 22 ref. (Q24)

276-Q. (Russian.) **Criterion of Strength in the Case of Brittle Fracture and Plane-Stressed Condition.** N. N. Davidenkov and A. N. Stavrogin. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* 1954, no. 8, Aug., p. 101-109.

Glass and plaster test specimens used in developing the theories. Graphs, diagrams, table. 7 ref. (Q26, Q23)

277-Q. (Russian.) **Contemporary Views on the Mechanisms of Plastic Deformation and Fracture During the Creep of Metals.** I. A. Oding. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* 1954, no. 8, Aug., p. 110-118, 1 plate.

Survey of the most popular theories. Micrographs, graphs, diagram. 13 ref. (Q3, Q24)

278-Q. (Russian.) **Correlation Between Composition, Temperature and Strength for Alloys of the Aluminum-Magnesium System.** I. I. Kornilov and L. I. Priakhina. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* 1954, no. 9, Sept., p. 85-89.

Solubility curves and various strength tests. Graphs, table. 9 ref. (Q23, N12, Al, Mg)

279-Q. (Russian.) **Physico-Chemical Phenomena in the Deformation of Metals.** V. I. Likhtman. *Uspekhi Fizicheskikh Nauk,* v. 54, no. 4, Dec. 1954, p. 587-618.

Creep of monocrystals; electrocapillary effect; influence of surrounding medium on mechanical properties of semicrystalline metals. Graphs, tables. 32 ref. (Q24, Q3, Au, Ag, Tl, Pb, Zn, Te, Pt)

280-Q. (Russian.) **Separate Influence of Structural Factors on the Cyclic Strength of Steel. I.** I. L. Mirkin and E. D. Tsypkina. *Zhurnal Tekhnicheskoi Fiziki,* v. 24, no. 12, Dec. 1954, p. 2209-2216.

Effect of ferrite grain size, preliminary hardening and composition. Tables. 15 ref. (Q23, ST)

281-Q. (Russian.) **Single Statistical Theory of the Strength of Solid Bodies. III.** S. D. Volkov. *Zhurnal Tekhnicheskoi Fiziki,* v. 24, no. 12, Dec. 1954, p. 2250-2260.

Influence of micro and macro stresses on mode of fracture. Graphs. 20 ref. (Q23, Q25, Al, Mg)

282-Q. (Book.) **Analysis of Deformation.** Keith Swainger, v. II. *Experiment and Applied Theory.* 365 p. 1954. Chapman & Hall Ltd., 37 Essex St., London, W.C.2, England. $9.80.

An examination of the available experimental evidence for the equilibrium deformation of solids having various boundary conditions. (Q24)

283-Q. (Book.) **S.S. Clan Alpine Static Experiments, Report No. R. 7** (Structural Tests in Still Water on Riveted Dry Cargo Ship). Admiralty Ship Welding Committee. 141 p. 1953. Her Majesty's Stationery Office, London, England. $6.75.

Stress response to various conditions of loading. (Q25, K13)

284-Q. (Book.) **S.S. Ocean Vulcan Sea Trials, Report No. R. 10** (Loaded Condition). Admiralty Ship Welding Committee. 200 p. 1953. Her Majesty's Stationery Office, London, England. $9.00.

Magnitude of acceleration and bending moments and variations of hydrostatic pressure along the ship. (Q25, K general)

285-Q. (Book.) **S.S. Ocean Vulcan Sea Trials, Report No. R. 11** (Ballast Condition). Admiralty Ship Welding Committee. 136 p. 1954. Her Majesty's Stationery Office, London, England. $6.25.

Analysis of stresses along the ship showing combinations of various actions causing highest stress amidships. (Q25, K general)

286-Q. (Book.) **S.S. Ocean Vulcan Static Experiments, Report No. R. 6** (Structural Tests in Still Water on Welded Dry Cargo Ship). Admiralty Ship Welding Committee. 165 p. 1953. Her Majesty's Stationery Office, London, England. $6.75.

Changes in stresses amidships due to changes in loading. (Q25, K general)

287-Q. (Book.) **Strength of Materials.** Joseph Marin and John A. Sauer. 2nd Ed. 518 p. 1954. Macmillan Company, 60 Fifth Ave., New York 11, N. Y. $6.75.

The mechanics of materials and its application to simple problems of design. (Q23)

R
Corrosion

81-R. Lead Lined Plus. *Chemical Engineering,* v. 62, Jan. 1955, p. 230, 232.

Anticorrosive film on lead liner protected by carbon or graphite layer. Photograph. (R10, Pb)

82-R. Reaction of Thallium With Oxygen and Moisture. J. T. Waber and G. E. Sturdy. *Electrochemical Society, Journal,* v. 101, Dec. 1954, p. 583-589.

Investigations in the range 25-75° C. to throw light on mechanism of atmospheric corrosion. X-ray diffraction confirms principal reaction product changes from Tl_2O to TlOH. Graphs, tables. 13 ref. (R3, M22, Tl)

83-R. Oxidation of Iron-Molybdenum and Nickel-Molybdenum Alloys. S. S. Brenner. *Electrochemical Society, Journal,* v. 102, Jan. 1955, p. 7-15.

Alloys do not exhibit "catastrophic oxidation" up to 1000° C. in either stationary or flowing atmospheres. Graphs, tables, micrographs. 13 ref. (R2, Fe, Mo, Ni)

84-R. Catastrophic Oxidation of Some Molybdenum-Containing Alloys. S. S. Brenner. *Electrochemical Society, Journal,* v. 102, Jan. 1955, p. 16-21.

Nickel or chromium cause rapid attack when added to binary iron-molybdenum alloys. Table, graphs, micrographs, photographs. 6 ref. (R2, Ni, Fe, Mo, Cr)

85-R. Corrosion of Titanium in Fused Chlorides. Formation of Pyrosols. C. B. Gill, M. E. Straumanis and A. W. Schlechten. *Electrochemical Society, Journal,* v. 102, Jan. 1955, p. 42-45.

Shows severe attack when immersed in molten alkali chloride bath in presence of air. Photographs, tables. 11 ref. (R6, Ti)

86-R. Hydrogen Blisters. Felipe Paredes and W. W. Mize. *Gas,* v. 30, Dec. 1954, p. 89-92.

Causes and methods of prevention in pipe lines. Photographs, diagrams, tables, map. 10 ref. (R2, ST)

87-R. Metal Materials for Handling Aqueous Hydrofluoric Acid. Mortimer Schussler. *Industrial and Engineering Chemistry,* v. 47, Jan. 1955, p. 133-139.

Behavior of several fabricated alloys. Welds at air-liquid interfaces are quite vulnerable. Tables, micrographs, photographs. 7 ref. (R5)

88-R. Corrosion in the Petroleum Industry. III. F. H. Garner and A. R. Hale. *Petroleum,* v. 18, Jan. 1955, p. 12-14.

Methods for testing corroded parts. Photographs. 24 ref. (R7, CN, Ni, AY, SS, CI)

89-R. Corrosion Prevention in Cooling Water Heat Exchangers. J. D. Munro. *Petroleum Engineer (Management Ed.),* v. 27, Jan. 1955, p. C35 + 11 pages.

Photographs, tables, diagrams. 6 ref. (R4)

90-R. Guard Your H-P Boilers Against These Forms of Corrosion. *Power,* v. 99, Jan. 1955, p. 90-93.

Appearance, location and cause of corrosion resulting in internal and external deterioration. Photographs, diagrams, table, micrograph. (R1, R4, ST)

91-R. Stop Losing Your Heating-System Dollars to Corrosion. *Power,* v. 99, Jan. 1955, p. 118-119.

Proper water treatment and a tight system slow down internal corrosion losses, care in pipe laying checks external attack. Oxygen and carbon dioxide are biggest trouble makers. Table. (R4, R10, ST)

92-R. (French.) **Problems Raised by the Combustion of Heavy Fuels in Gas Turbines.** Peter Sulzer. *Revue universelle des mines,* v. 10, ser. 9, no. 12, Dec. 1954, p. 715-724.

Deposit formation; corrosion of steels under the effect of ashes; remedies. Photographs, diagrams, graph, table. (R7, ST)

93-R. (German.) **The Effect of Organic Inhibitors on the Dissolving of Iron in Acids.** J. Elze. *Metalloberfläche,* Ausgabe A, v. 8, no. 12, Dec. 1954, p. 177-179.

Investigations with a redox electrode; effect of inhibitors in the presence of an oxidizing agent. Tables, graphs. 8 ref. (R10, Fe)

94-R. (German.) **The Initial Corrosion of Metals in Contact With Aqueous Solutions at Room Temperatures.** Fritz Tödt. *Werkstoffe und Korrosion,* v. 5, no. 11, Nov. 1954, p. 430-433; disc., p. 433.

Differentiates between two types and in both cases it is assumed that a local element is formed, which can be verified by evidences of coating. Tables. 10 ref. (R5, Al, Fe)

95-R. (German.) **The Application of Electrochemical Methods to the Investigation of Corrosion.** Marcel Pourbaix. *Werkstoffe und Korrosion,* v. 5, no. 11, Nov. 1954, p. 433-440; disc., p. 440.

Series of electrochemical equilibrium diagrams predict extent of metal corrosion. Polarization curves give information on appropriate protective measures to be taken. Diagrams, graphs, circuit diagrams. 25 ref. (R11, Fe, ST)

96-R. (German.) **The Protection of Steel Constructional Work From Corrosion.** Karl Krenkler. *Werkstoffe und Korrosion,* v. 5, no. 11, Nov. 1954, p. 441-451.

Conditions promoting rust formation; cleaning and treatment of metal surfaces; application factors of protective coatings; selection of proper anticorrosive paints. Photographs, diagrams, graphs. 4 ref. (R3, L26, Fe)

97-R. A Natural Inhibitor of Pitting Corrosion of Copper in Tap-Waters. Hector S. Campbell. *Journal of Applied Chemistry,* v. 4, Dec. 1954, p. 633-647.

An unidentified, apparently organic inhibitor with a bluish-white fluorescence. Tables, graphs, diagrams, photographs, circuit diagrams, polarograms. 8 ref. (R10, R4, Cu)

98-R. Corrosion Due to Mud Banks in River Estuaries. W. S. Patterson. *Journal of Applied Chemistry,* v. 4, Dec. 1954, p. 661-666.

Examines abrasion on paints, anaerobic corrosion, water-line corrosion and sulfide concentrations. Graphs, tables. 8 ref. (R8, Fe)

99-R. Laboratory Studies on the Use of Coal-Tar Bases as Inhibitors of Corrosion by Flue Gases. R. W. Kear. *Journal of Applied Chemistry,* v. 4, Dec. 1954, p. 674-679.

Bases sprayed into gas streams reduced corrosion by SO_3 so long as it was below the dew point (136° C.). Diagram, graphs. 9 ref. (R10, ST)

100-R. (German.) **Corrosion and Corrosion Protection of Underground Petroleum Tanks.** Hugo Kiemstedt. *Erdöl und Kohle,* v. 7, no. 12, Dec. 1954, p. 833-835.

Various causes of corrosion of inside tank wall and the cement-coating process as an effective protection against rust. Diagrams. 7 ref. (R7, R10, Fe)

101-R. (Italian.) **The Behavior of Aluminum Exposed for Long Periods to a City Atmosphere.** C. Panseri and A. Gragnani. *Alluminio,* v. 23, no. 6, Dec. 1954, p. 627-637.

Chemical analysis and mechanical and micrographical tests of samples of 50-yr. old low-purity roofing sheets shows excellent behavior with pitting of corroded zones held below 0.1 mm. Photographs, micrographs, tables. 6 ref. (R3, Al)

102-R. (Italian.) **Aluminum-Graphite Galvanic Couple in Light-Alloy Corrosion.** A. Prati. *Alluminio,* v. 23, no. 6, Dec. 1954, p. 639-649.

Results of corrosion tests made on Raffinal alloy and short-circuited with graphite. Micrographs, photographs, tables, graphs, diagrams. 7 ref. (R11, Al)

103-R. (Russian.) **Corrosion of Stainless Steels in Acidic Oxidizing Solutions. New Types of Corrosion Failure of Weld Joints.** M. M. Kurtepov. *Doklady Akademii Nauk SSSR,* v. 99, no. 2, Nov. 11, 1954, p. 305-306 + 1 plate.

Cites a particular case of intercrystalline corrosion of 18-8 type steel between solid metal and the weld seam. Micrographs. 3 ref. (R5, K general, SS)

104-R. (Russian.) **Mechanism of Self-Passivation of Metals in Oxidizing Media.** V. P. Batrakov. *Doklady Akademii Nauk SSSR,* v. 99, no. 5, Dec. 11, 1954, p. 797-800.

Expanded electrochemical treatment; relative importance of various factors. Graphs. 6 ref. (R10)

105-R. (Russian.) **Corrosion of Steels by Hot Alkaline Solutions Under Pressure.** Kh. L. Tseitlin, N. K. Kurcheninova, S. M. Babitskaia and A. A. Babakov. *Khimicheskaia Promyshlennost,* 1954, no. 7, Oct.-Nov., p. 438-440.

Stainless steels in unstressed state are more resistant to corrosion but less resistant to formation of cracks than low-carbon steels in stressed state. Tables. (R5, SS, AY, Cr, Ni, Mo)

106-R. The Five Per Cent Salt Spray Test and Its Acetic Acid Modification. Wardley D. McMaster. *ASTM Bulletin,* 1955, no. 203, Jan., p. 62-69.

Salt spray quickly compares quality and thickness of various coatings for metal; acetic acid further accelerates test; 95° F. is best temperature. Tables, photographs, graph. 17 ref. (R11)

107-R. Corralling Corrosive Chemicals. *INCO,* v. 26, Jan. 1955, p. 26-29.

Use of nickel alloy valves in chemical and petroleum industries. Photographs, diagrams. (R general, T29, Ni)

108-R. Cathodic Protection. Morris Mote. *Mines Magazine,* v. 44, Dec. 1954, p. 35-38, 42.

In order to fulfill the requirement that design of a structure should include corrosion prevention, the use of cathodic as well as anodic protection is rapidly expanding. 10 ref. (R10, ST)

109-R. (English.) **The Mechanism of Oxidation of Metals From the Viewpoint of the Transition State Theory.** E. A. Gulbransen. Paper from "International Symposium on the Reactivity of Solids, Gothenburg 1952, Proceedings". Ingeniörsvetenskapsakademien and Chalmers Tekniska Högskola, p. 899-907; disc., p. 907-908.

Theoretical explanation of the wide variations in experimental values of entropy and heat of activation for 13 metals. Graphs, table. 13 ref. (R2)

110-R. (German.) **The Attack of Iron-Saturated Zinc Melts on Silicon-Containing Iron.** Dietrich Horstmann. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 11-12, Nov.-Dec. 1954, p. 527-533.

Corrosive effect of zinc saturated with iron on iron-silicon alloys as a function of silicon content and temperature. Tables, graphs, micrographs. 8 ref. (R6, Fe, Si)

111-R. (German.) **Corrosion and Protection Against Corrosion in the Telecommunications Construction Industry.** H. Lorke. *Nachrichtentechnik,* v. 4, no. 11, Nov. 1954, p. 494-498.

Types of corrosion; metallic and nonmetallic protective coatings; inspection and care of telecommunication lines. Diagrams, photographs. 12 ref. (R general, L general, T1, Fe, ST)

112-R. (German.) **Application of the Theory of Disorder Phenomena in Heterogeneous Solid Solutions to the Development of Non-Scaling Metal Alloys.** Karl Hauffe. Paper from "International Symposium on the Reactivity of Solids, Gothenburg 1952, Proceedings". Ingeniörsvetenskapsakademien and Chalmers Tekniska Högskola. p. 823-844; disc., p. 844-845.

Role of diffusion processes in oxide layer formation. Graphs. 38 ref. (R2, N10)

113-R. (Polish.) **Corrosion of Steel in Molten Salts and Alkali at 475 to 500° C.** H. Jodko and M. Wiekiera. *Przemys Chemiczny,* v. 10, no. 12, Dec. 1954, p. 593-599.

Attack on carbon, stainless, and chromium-aluminum - silicon - molybdenum steels by three common salt mixtures used as heat transfer media. Tables, photographs, graphs. 7 ref. (R6, ST)

114-R. (Russian.) **Possible Mechanism of Fracture of a Metal in a Corrosive Medium.** Iu. N. Rabotnov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* 1954, no. 6, June, p. 53-56.

Mathematical investigation of stress corrosion. Graph. 1 ref. (R1)

115-R. (Russian.) **Electroreducing Processes on Oxidized Steel. I. Electroreduction of Oxygen.** A. S. Afanas'ev and E. N. Chankova. *Zhurnal Fizicheskoi Khimii,* v. 28, no. 11, Nov. 1954, p. 1975-1986.

Cathode polarization curves for etched steel and steel covered by four types of oxides; significance of current density and other factors; numerical values for Tofel's formulas. Graphs, tables. 8 ref. (R2, ST)

S

Inspection and Control

26-S. A Simple Microscope Attachment for Observing High-Temperature Phenomena. J. H. Welch. *Journal of Scientific Instruments,* v. 31, Dec. 1954, p. 458-462.

Small, electrically heated thermocouple, in contact with thermojunction, permits study of reactions occurring during the formation of cements and blast furnace slags. Micrographs, diagrams, circuit diagrams. 1 ref. (S16, M23, B21)

27-S. The Application of Metal Powder Association Core Standards and Data Sheets. Lester M. Becker. *Metal Powder Association, Proceedings,* v. 2, 1954, p. 91-98.

Review of progress in standardization of dimensions and properties of powdered iron cores by the Electronic Core Division. Photographs, table, diagrams. (S22, H11, Fe)

28-S. Standard H-Steels, 1330-H to 3316-H. *Metal Progress,* v. 67, Jan. 1955, p. 128B.

Data sheet giving hardenability limits for five series of alloy steels. (S22, J26)

29-S. Radiographic Inspection of Petroleum Pipe Lines. Harold Horland. *Pipe Line News,* v. 26, Dec. 1954, p. 39-43.

Merits of method; selection of proper radiographic sources; weld inspection and control; costs. Photographs, tables. 2 ref. (S13)

30-S. Using the Interference Microscope for Thickness Measurements of Decorative Chromium Plating. J. D. Thomas and Stanley R. Rouse. *Plating,* v. 42, Jan. 1955, p. 55-57.

To replace "spot test" because of acid attack on base metal. Photographs, micrographs, diagrams. 4 ref. (S14, L17, Cr)

31-S. (German.) **Tolerances and Errors in Measuring Temperature With Thermocouples. Pointers on the Practical Use of Thermocouples and Protective Tubes.** Kurt Guthmann. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 11-12, Nov.-Dec. 1954, p. 535-561.

Definition of terms; uses, standards, tolerances and relative accuracy of thermocouples; indicating and recording instruments. Tables, graphs, diagrams, photographs. 78 ref. (S16)

32-S. (German.) **Research on the Effect of Structure on the Extinction of Ultrasound Waves in Metals.** Hugo Josef Seemann and Werner Bentz. *Zeitschrift für Metallkunde,* v. 45, no. 12, Dec. 1954, p. 663-669.

Review of literature and experimental data on aluminum, iron, steel and copper to determine influence of grain size on loss of intensity of high-frequency elastic waves. Diagram, table, graphs, photographs. 8 ref. (S13, P10, Al, Fe, ST, Cu)

33-S. (German.) **Industrial Experiences With the Magnatest Q Instrument.** Hans Beuse and Herbert Koelzer. *Zeitschrift für Metallkunde,* v. 45, no. 12, Dec. 1954, p. 677-686.

Correlation between magnetic characteristics and composition of steels; sorting, hardness testing, and locating defects. Graphs, tables, photographs. 5 ref. (S13, S11, P16, Q29, ST)

34-S. (Book.) **The Composition and Assaying of Minerals.** John Stewart-Remington and Wilfrid Francis. 128 p. 1953. Philosophical Library, Inc., 15 East 40th St., New York 16, N. Y. $5.50.

Guide for mineralogists, metallurgists, geologists, chemists, and students. (S11)

T

Applications of Metals in Equipment

27-T. Steels for High Temperature Steam Pipes. J. M. Robertson. *Alloy Metals Review,* v. 8, Dec. 1954, p. 2-7.

Factors influencing behavior of medium alloy steels at high temperatures. Graph, table. (T27, AY)

28-T. Permeability Tuning, an Electronic Application of Iron Powder Cores. David M. Hodgin. *Metal Powder Association, Proceedings,* v. 2, 1954, p. 84-88; disc., p. 88-89.

Electronic design problems of significance to powder metal producers. Photographs, diagrams. (T1, H general, Fe)

29-T. Origin of the Modern Air-Cooled Cylinder. S. D. Heron. *Metal Progress,* v. 67, Jan. 1955, p. 137-140.

The idea of using aluminum instead of cast iron for the cylinders of air-cooled engines was an important milestone in aircraft development. It apparently originated with an Englishman who was inspired by an unknown Italian; their pioneering work is herewith belatedly acknowledged. Diagrams, photographs. (T25, Al)

30-T. Equivalent Carbide Grades. *Tool Engineer,* v. 34, Jan. 1955, p. 117.

Reference table of ten manufacturers' recommendation for standard grades. Table. (T6, S22, C-n)

31-T. (German.) **New Data on Carbide Core Bits and Drills.** H. Wilde. *Berg- und hüttenmännische Monatshefte der montanistischen Hochschule in Leoben,* v. 99, no. 10, Oct. 1954, p. 188-193.

Advantages of carbide bits and drills, especially of those using spiral cutting edges. Diagrams, photographs, table, graph. (T7, C-n)

32-T. New All-Metal Sandwich Structures. John V. Long and George D. Cremer. *Materials & Methods,* v. 41, Jan. 1955, p. 96-98.

Exhibit high-temperature resistance up to 1500° F., high strength-to-weight ratio and good sound and heat insulation. Photographs, graph, diagram. (T26, T24)

33-T. Modern Food Processing Equipment Utilizes Nickel Stainless Castings for Essential Components. *INCO,* v. 26, Jan. 1955, p. 14-18.

Types of steel for processing various food products. Photographs, table. (T29, SS)

34-T. (Book.) **Master Boiler Makers' Association, Official Proceedings, (Annual Volume),** v. 52, 1954, 161 p. Master Boiler Makers' Association, Albert F. Stiglmeier, Secretary, 29 Parkwood St., Albany, N. Y.

Cleaning, testing, repairing, and maintenance of boilers and parts in steam and diesel systems; cutting, fabrication, and welding of sheet iron parts; maintenance and repair of unfired pressure vessels. (T25, ST)

V

Materials

General Coverage of Specific Materials

42-V. The Copper Industry in Australia. A. L. Simmons. *Metal Progress,* v. 67, Jan. 1955, p. 87-92.

The dilemma of finding more ore reserves for a metal which is suddenly needed in plenty now confronts the Australian copper industry. The production from new workings, started in recent years to meet the demands of an expanding industrialization, posed a problem for a time because of the industry's inadequate refining capacity; today the problem concerns the rapidly dwindling 12-yr. supply of domestic ores. Fabricating capacity, comprised of a number of young and technologically modern companies, will soon be adequate to meet foreseeable needs. Map, photographs, table. 4 ref. (A4, B10, Cu)

43-V. A Turbine-Blade Alloy Castable and Low in Cobalt and Columbium. W. Siegfried and F. Eisermann. *Metal Progress,* v. 67, Jan. 1955, p. 141-146.

Work to discover a "superalloy" capable of investment casting (mass production) and economical in scarce alloying metals. Work which indicates that cast turbine blades are no more susceptible to thermal shock than the forged blades successfully used in gas turbines. Diagrams, graphs, photographs, table. (T25, E15, SG-h)

44-V. Aluminum-Base Copper-Cadmium Alloys. E. A. G. Liddiard. *Product Engineering,* v. 26, Jan. 1955, p. 192-196.

Properties and applications for new age-hardening alloys offers increased production rates, lower costs and less critical heat treatment. Photographs, graphs, tables. 8 ref. (Al)

45-V. (Czech.) **Some Properties of Spheroidal Iron Inoculated With Dowmetal.** Zdenek Hostinsky and Cestmir Hlousek. *Slévarenství,* v. 2, no. 11; *Prace Ceskoslovenského Vyzkumu Slévarenského,* v. 1, no. 12, Nov. 1954, p. 77-88.

Casting behavior, mechanical properties, corrosion resistance and applications. Diagrams, tables, micrographs, graphs, photographs. 93 ref. (CI)

46-V. (Czech.) **Cold Rolled Steel Sheet.** Augustin Havlik. *Hutnické Listy,* v. 9, no. 11, Nov. 1954, p. 647-650.

Rolling conditions and equipment; heat treatments; mechanical properties; applications; microstructures. Tables, photographs, micrographs. 6 ref. (CN)

47-V. (Dutch.) **Copper and Copper Alloys. XIV. Special Brass.** W. G. R. de Jager. *Metalen,* v. 9, no. 23, Dec. 15, 1954, p. 381-383.

Mechanical, physical and corrosion properties. (Q general, P general, R general, Cu)

48-V. (German.) **Progress in the Metallurgy of Iron.** A. Keller. *Chimia (Switzerland),* v. 8, no. 12, Dec. 1954, p. 271-283.

Processes of heat treatment, surface protection, welding and machining for various types of steels, sintered materials and cast iron; methods of measurement and material testing. 142 ref. (Fe, ST, AY)

49-V. (Polish.) **Economical Bearing Alloy $ZnAl_{10}Cu_5$.** *Hutnik,* v. 21, no. 8, Aug. 1954, *Biuletyn Informacyjny, Instytutow Ministerstwa Hutnictwa,* v. 5, no. 8, 1954, p. 29-32.

Composition, structures, mechanical properties and applications. Tables, graphs. 2 ref. (Zn)

50-V. (Polish.) **Aluminum Bronzes: Their Manufacture, Properties, and Uses.** Kazimierz Kurski. *Wiadomosci Hutnicze,* v. 10, no. 11, Nov. 1954, p. 314-320.

Effect of alloying additions; corrosion resistance. Diagram, graphs, tables. 7 ref. (Cu)

51-V. Zirconium. Sources, Extraction and Properties. G. L. Miller. *Iron & Steel,* v. 28, Jan. 1955, p. 19-25.

Production, fabricating characteristics, corrosion behavior, mechanical properties and physical constants. Tables, diagrams, graph. 32 ref. (Zr)

52-V. New Tough High Strength Steel Cuts Fabrication Cost. John B. Campbell. *Materials & Methods,* v. 41, Jan. 1955, p. 102-106.

Composition, properties and applications. Photographs, tables, graphs. (AY)

53-V. Wrought Non-Leaded Brasses. John L. Everhart. *Materials & Methods,* v. 41, Jan. 1955, p. 111-126.

Compositions, properties, applications. Photographs, tables. (Cu, Zn)

54-V. Characteristics of Magnesium Alloys. *Materials & Methods,* v. 41, Jan. 1955, p. 131, 133.

Table of compositions and characteristics. (Mg)

55-V. (German.) **Systematology of the Cast Iron Group of Materials.** Adalbert Wittmoser. *Giesserei,* v. 41, no. 26, Dec. 23, 1954, p. 685-692.

Review of iron-carbon alloys exceeding 1.7% carbon; development of malleable and gray iron; definition of terms. Micrographs, graphs, diagrams. 80 ref. (CI)

56-V. Rare Metal Series: Beryllium. A. F. G. Cadenhead. *Canadian Metals,* v. 18, Jan. 1955, p. 18-19.

History, occurrence, and supply in the U. S. (Be)

57-V. Physical and Mechanical Properties of Rhenium. Chester T. Sims, Charles M. Craighead and Robert I. Jaffee. *Journal of Metals,* v. 7, Jan. 1955; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Jan. 1955, p. 168-179.

Fabrication by powder metallurgy; physical and mechanical properties; oxidation resistance. Tables, micrographs, photographs, diagram, graphs. 17 ref. (H general, P general, Q general, R2, Re)

58-V. Rules for Cutting, Forming, Cleaning and Heat-Treating Titanium Sheet Metal. *Metal-Working,* v. 11, Feb. 1955, p. 16-17.

Typical mechanical properties; characteristics of various classes of titanium alloys. Tables, diagrams. (Ti)

EMPLOYMENT SERVICE BUREAU

The Employment Service Bureau is operated as a service to members of the American Society for Metals and no charge is made for advertising insertions. The "Positions Wanted" column, however, is restricted to members in good standing of the A.S.M. Ads are limited to 50 words and only one insertion of any one ad. Address answers care of A.S.M., 7301 Euclid Ave., Cleveland 3, O., unless otherwise stated.

POSITIONS OPEN

East

MATERIALS ENGINEER: Graduate in metallurgy or chemical engineering with practical industrial experience in heat treating and standardization of ferrous and nonferrous metals. Some mechanical engineering experience desirable. Box 3-15.

CORROSION AND MATERIALS ENGINEER: Must be graduate metallurgist with 5 to 10 years experience in oil refinery corrosion and metallurgy work. Position in New York City area. Good salary commensurate with experience and background. Box 3-20.

PLANT METALLURGIST: With 5 to 10 years diversified experience in manufacturing operations including forging, heat treating and plating. Company has modern laboratory facilities. Send resume and salary requested to: Employment Manager, Wallace Aviation Corp., Wallingford, Conn.

PLANT MANAGER: Experienced in melting and fabrication of titanium and titanium alloys. Box 3-25.

METALLURGIST: To assist chief metallurgist. Not more than 2 or 3 years industrial experience, emphasis on process control and development. Excellent opportunity for advancement with medium-sized copper based nonferrous metals manufacturer. All replies treated confidentially. Box 3-30.

METALLURGIST: With aptitude for research and development in field of high alloy steels. Prefer man with laboratory experience, possessing sound background in physical metallurgy, capable of organizing research projects and writing clear, concise reports. Opportunities for professional development and advancement. In reply, indicate training, experience, military status, salary required. Box 3-35.

MANUFACTURERS AGENT: Wanted by known manufacturer of ferrous and nonferrous precision castings. New York City, vicinity and neighboring states. Box 3-40.

PHYSICAL METALLURGISTS: Desiring to undertake graduate studies while working on government-aided research projects at leading eastern university, New York City. Box 3-45.

METALLURGISTS: With graduate training in research, for research and development of heat resistant metals and alloys, including development of chromium-base alloys, study of equilibrium diagrams, evaluation of oxidation resistance, determination of creep resistance and stress corrosion; establishing control of adhesion of coatings, etc. Salary commensurate with training and experience. Interested persons should contact the Industrial Relations Office, Watertown Arsenal, Watertown 72, Mass.

INSTRUCTOR: M.S. or Ph.D. in physical metallurgy or metallurgical engineering to teach undergraduate service courses in physical metallurgy, materials engineering and allied courses to mechanical and industrial engineering majors. Position with growing northeastern state university, ideally located. Box 3-50.

ASSISTANT PROFESSOR: Ph.D. in physical metallurgy wanted by September to teach one undergraduate and one graduate course in physical metallurgy and do research at large privately owned eastern university with separate school of metallurgical engineering. Salary $450 per month minimum, increased according to experience. State educational and research background. Box 3-55.

JUNIOR ENGINEER TRAINEES: June graduates for one and two-year training programs leading to design, development, research, marketing and manufacturing positions in production, transportation products and atomic energy products division. From 26 to 32 years of age, excellent salaries and other liberal benefits. Training in New York, Pennsylvania and Texas. Write to: George Y. Taylor, Director, Personnel Dept., American Locomotive Co., Schenectady 5, N. Y. referring to Position S-67.

Midwest

METALLURGICAL ENGINEER: B. S. degree plus 1 to 3 years experience, for research and process development in special alloys having atomic energy application. Location in Ohio. Send complete description of work experience, present salary, etc. Box 3-60.

METALLURGICAL ENGINEER: B.S. degree plus 1 to 3 years experience with interest in welding application and development of welding materials and processes in special alloys including titanium, zirconium, etc. Location Ohio. Please include complete description of work experience, present salary, etc., in reply. Box 3-65.

METALLURGICAL/CHEMICAL ENGINEER: Recent graduates for comprehensive training program for men interested in plant metallurgy. Prominent integrated producer with emphasis given to specialty steels. Several possible locations in midwest or east. Please send complete resume. Box 3-70.

ASSISTANT EXTRUSION SUPERVISOR: To assist in operation of medium-sized accumu-

lator-type horizontal extrusion press. Minimum requirement of two years as engineer, supervisor, or assistant supervisor on 1000-ton or larger press. Write details of education, experience, age, references, etc. Box 3-75.

CHEMIST: B.S. degree plus experience in ferrous, nonferrous and industrial chemistry. Must have ability to investigate and solve shop problems connected with paint, oil, surface treatments and machining coolants in addition to more advance laboratory analytical work in automotive plant. Give details of education, experience, age, references and present salary in first letter. All replies held confidential. Box 3-80.

METALLURGICAL ENGINEER: Young man with degree in metallurgy to assist chief metallurgist in laboratory analysis and solving production problems relating to use of tool-steels, ferrous and nonferrous metals, including brass and aluminum, which are subjected to cold working and annealing processes. Research on tool and die life. Lubrication. Box 3-85.

SALES ENGINEERS: Manufacturer of industrial furnaces and related equipment has openings providing excellent incomes for sales engineers in several district offices (midwest, east and west). Experience in sales desirable but knowledge of heat treating and engineering degree, and management potential, more essential. Send complete resume of education and experience, with references. Box 3-90.

METALLURGIST: Graduate with interest in research and development with 1 to 5 years experience for small steel mill in Eastern Ohio. Work on diversified metallurgical development projects associated with pickling, cold rolling, heat treating, finishing, hot dipping, electroplating, etc., of carbon steel. Box 3-95.

PHYSICAL METALLURGIST: For technical administration, planning, and coordination of metallurgical research. Comprehensive knowledge of fundamentals and extensive experience required. Proven ability to prepare and review technical reports a prerequisite. Starting salary $7040. Interested persons requested to send application on Federal Standard Form 57 to Bureau of Mines, Rolla, Mo.

METALLURGIST: Quality control work. Graduate with at least one year mill training and experience in nonferrous metalworking industry, but will consider recent graduate. Salary range $375-450 per month: SALES ENGINEER: Graduate metallurgist, will consider recent graduate. Will confer with executive and engineering personnel of customers to assist them in problems of selecting materials for their needs, application of proper design and techniques in operation. Requires sales interest and ability, technical writing ability, must be good correspondent. Salary range $375-450 per month. Write Byron A. Grove, Employment Manager, Revere Copper and Brass Inc., 2200 North Natchez Ave., Chicago 35, Ill.

PHYSICAL METALLURGISTS: Opportunity for graduate study toward M.S. or Ph.D. degree while employed as research assistant on fundamental research project in well-equipped modern laboratory at large state university. Applications now being accepted for qualified candidates. Box 3-100.

POSITIONS WANTED

ENGINEERING ECONOMIST: With 15 years metallurgical background, degrees in economic science and business administration, experienced in all phases of production control and plant operation, also foreign market experience. Veteran, married, one child, Resume on request. Presently employed, willing to relocate. Box 3-110.

EXECUTIVE METALLURGIST: Director of technical processes, graduate metallurgical engineer, professional license. Age 33, married, children. Desires position utilizing managerial background. Ferrous and nonferrous, laboratory control, plating, welding, corrosion, machinability, heat treatment, including selective hardening. Specifications and inspection systems. East Coast. Minimum salary $10,000. Box 3-115.

METALLURGICAL ENGINEER: M.S. degree, age 32, family. Seven years diversified experience in industrial and aircraft metallurgy including heat treating ferrous and nonferrous, writing specifications and inspection standards, testing, application of materials and processes to new designs, tooling, cost reduction, welding. Desires development or sales engineering. Resume available. Box 3-120.

ENGINEER: M.S. degree, age 39. Corrosion and materials engineer. Extensive chemical and metallurgical experience. Can analyze design and operational factors in plant equipment failures. Knows carbon, alloy and stainless steel fabrication, welding, heat treatment and corrosion prevention. Expert on steel pipe corrosion. Accomplished report writer. Successful personnel relations. Box 3-125.

PHYSICAL METALLURGIST: B. S. degree in metallurgical engineering, age 31, married. Six years diversified experience in research on titanium and its alloys. Includes chemical and galvanic corrosion, welding, production, fabrication and testing. Desires position in Southeast or East. Box 3-130.

POWDER METALLURGY EXECUTIVE: With 15 years experience production of parts from metal powders. Process specification and control, tool design, cost estimating and customer contact. Graduate metallurgical engineer. Has set up plants and managed them. Wide experience all phases powder metallurgy. Works well with people. Age 39. Box 3-135.

METALLURGICAL ENGINEER: M.S. degree in metallurgical engineering, registered professional engineer. Applied experience in most phases of metallurgy, foundry, steel production, heat treatment of automotive, aircraft parts. Currently in production work in Canada, British subject. Desires firm to sponsor immigration for permanent position in U.S. Box 3-140.

METALLURGIST: B.S., age 30, family. Six years research, mill metallurgy and fabrication. Four years forged turbine and compressor blades for jet engines, covering production, development, raw materials, lab supervision, specifications and administration. Interested in high-temperature alloys. Desires challenging and responsible contact position in jet aircraft or related industry. Will consider production or development. Box 3-145.

METALLURGICAL SALES REPRESENTATIVE: Graduate mechanical engineer plus equivalent of metallurgical degree. Age 36, family. Eleven years diversified experience in ferrous, nonferrous parts and materials, production and management. Widely known aircraft and midwest metals trades. Possess drive, personality, appearance, marketing training and knowledge of market in Chicago-Detroit industrial areas. Box 3-150.

METALLURGICAL ENGINEER: M.S. degree, age 26, married. Five years diversified research experience pertaining to alloy steel and high-temperature alloy problems. Desires responsible position in high-temperature alloy development, possibly including processing problems of such materials. Pittsburgh district preferred. Box 3-155.

RESEARCH AND DEVELOPMENT COORDINATOR: B.S. and M.S. degrees, age 38, single, 14 years background and achievement in industrial research. Organized and planned long-range research projects, initiated close coordination between engineering and production in promotion of functions relating to research and development. Desires responsible position with expanding metals processing or metal products firm. Box 3-160.

SALES ENGINEER—STEEL AND FORGINGS: Responsible family man, age 40. Five years with Army Ordnance as classification analyst and chief inspector setting up manufacturing methods at forge shops, foundries and machining sources. Eight years with large steel forging manufacturer, coordinating

production and quality control and representative to customers. Mechanical engineering and physical metallurgy background. Aggressive, can assume heavy responsibilities. Box 3-165.

METALLURGICAL ENGINEER: B.S. degree, veteran, married, age 28. Four years experience, two in general metallurgy, two in research. Desires responsible position in Midwest. Box 3-170.

ENGINEERING SUPERVISOR: Metallurgical, chemical. Age 28, family. Four years aircraft engine background in materials and process quality control and testing, specification writing, failure analysis and vendor liaison. Desires responsible position, preferably with western firm, where drive and proven administrative ability are needed. Box 3-175.

METALLURGICAL ADMINISTRATOR: Age 39, family. Desires work which will utilize 16 years experience in steel metallurgy. Four years in nationally known research laboratory, 7 years as chief metallurgist large steel foundry, 5 years as chief metallurgist large forge shop, forging steel, titanium and high-temperature alloys. Box 3-180.

SALES ENGINEER: Mechanical or metallurgical products. B.S. degree in mechanical engineering, age 32. Experience in process engineering in metal manufacturing plant, technical sales in metalworking, finishing, foundry, hydraulics and heat treating. Knows machine tools. Familiar with Northeast. Interested only in long-term connection. Box 3-185.

METALLURGICAL ENGINEER: M.Met.E. degree, age 27. Has 2½ years experience in fabrication and development of semiconductor devices including purification through packaging. Two years in research on magnesium alloys, including melting, working and physical testing. Desires position with varied responsibilities. Box 3-190.

ADMINISTRATIVE CORROSION ENGINEER: Nine year progress record with present employer covering laboratory evaluation, technical reporting, sales-service to present position as manager of manufacturing plant. Above related to phosphate coatings and finishes primarily, however, interest in corrosion prevention in any field. Interested in position challenging ability and financially rewarding, or potentially so. Box 3-195.

METALLURGIST: M.S. degree, age 28, single. One year in copper smelter and three years in openhearths, electric, blast furnaces, mills, heat treatment and foundry in U. S. and Canada. Special interest in steelmaking and quality control at openhearths and electric furnaces. Migrating to U. S. to become citizen. Box 3-200.

MANUFACTURERS REPRESENTATIVE: Desires accounts for promotion to metalworking industries in New England. Box 3-205.

CHIEF METALLURGIST, LABORATORY DIRECTOR: M.S. degree, age 44. Service in responsible capacity for past 20 years, experience in basic and practical research, material selection and specifications, fabrication methods, production troubleshooting and laboratory supervision, stainless, carbon and alloy steels, nonferrous and coated metals. Experienced administrator, consultant and technical writer. Interested in responsible and challenging position with progressive company. Box 3-210.

TUNGSTEN CARBIDE METALLURGIST

For growing company in East. To set up laboratory and to supervise development and production. Excellent opportunity for growth. Please submit resume of experience, references, data.

Box 3-10, Metals Review

SALES EXECUTIVE

In large iron powder producing company—experience in powder metallurgy preferred. Qualifications must be stated in detail and will be treated strictly confidential.

Hoeganaes Sponge Iron Corp., Taylor Lane and River Rd., Riverton, N. J.

LABORATORY TECHNICIAN: Metallurgy or research and development. Married, veteran. Have proficiency for two-year course in metallurgy and certificate for one-year course in welding engineering. Studied one year of mechanical engineering. Two years supervision in subassembly, charge of fabrication and welding problems, qualified for research and development. Desires position in any of above or related fields. Philadelphia area. Box 3-215.

METALLURGIST: Gray iron foundryman, age 42, 18 years jobbing and production experience. Laboratory melting, pouring, testing, sand control, machining, customer contact, molding, gating, risering. Last seven years trouble shooting. Desires permanent position in research, production or technical sales, preferably midwest. Box 3-220.

METALLURGICAL ENGINEER: Degree and graduate work in metallurgical engineering and industrial administration. British, age 33, married. Ten years specialized experience aluminum and magnesium alloys extrusion, rolling, tubing and general light alloy research, toolsteels, operations research. Concise, well-written reports. Experience in production management and customer contacts. Familiar U. S., British and Canadian aluminum industry and research establishments. Knowledge of languages. Desires affiliation with responsible U. S. company. Resume on request. Box 3-225.

DEVELOPMENT SUPERVISOR: Excellent record ten years experience in research, development and technical assistant to fabricators. Supervisor of development laboratory, with good knowledge of aluminum industry and welding techniques. Seeks responsible position in product development, administration, with good opportunities. Age 32. Box 3-230.

METALLURGIST: Age 34, married, metallurgical engineering degree and other technical training, presently in material quality analysis. Experience as senior metallurgist in automotive field and metallurgical quality control work. Broad metallurgical experience. Box 3-240.

METALLURGICAL ENGINEER: B.S. degree, age 27, energetic, two years with large steel producer bar and sheet products, Pittsburgh district. Desires change, would consider construction. Willing to travel. Box 3-245.

METALLURGIST: M.S. degree, age 33, family, veteran. Has 2½ years experience in X-ray diffraction, high-temperature vacuum and phase diagram work; 4½ years in diverse ferrous and nonferrous metallurgical research investigations. Presently employed in supervisory research position by large manufacturer. Desires responsible position in research or development in Northwest or West. Complete resume on request. Box 3-250.

SOLID-STATE PHYSICIST OR PHYSICAL METALLURGIST to lead long-term research primarily on metals, including such subjects as diffusion in solids, anelasticity, mechanical and thermal behavior at elevated temperatures, and behavior of single crystals. University operated laboratory, Los Angeles area.

Send summary of qualifications to:

Caltech
JET PROPULSION LABORATORY
4800 Oak Grove Drive
Pasadena 3, California

ANALYTICAL CHEMIST

To purchase Commercial Laboratory specializing in analysis of metals and alloys, both ferrous and nonferrous. Established over 50 years, with excellent reputation. Located in East. Splendid opportunity for one or two qualified men to make at least $10,000 each per year. $15,000 cash necessary.

Box 3-5, Metals Review

METALLURGISTS

Expanding program in the processing of metal used in the AEC program will provide positions in the field of applied nonferrous metallurgy for men qualified for development and production work. Well-rounded background in physical metallurgy is desirable but all levels of experience will be considered. Candidates must be eligible for AEC security clearance.

Replies, which will be held in confidence, should include details concerning previous employment, education, salary requirements, personal background and references.

Uranium Division
Mallinckrodt Chemical Works
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Attractive opportunity offered to

METALLURGISTS

in the fields of

MECHANICAL METALLURGY
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FERROUS AND NON-FERROUS

Both experienced and trainee applications will be considered

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Phone EXbrook 4-3241,
EXtension 339

DOUGLAS

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